NAVE NATIONAL ASSESSMENT OF VOCATIONAL EDUCATION

FINAL REPORT TO CONGRESS

U.S. Department of Education
Office of the Under Secretary
Policy and Program Studies Service

NATIONAL ASSESSMENT OF VOCATIONAL EDUCATION

FINAL REPORT TO CONGRESS

2004

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Executive Summary

Eighty-five years ago the federal government first committed to vocational education as a national priority.[1] Since then, the enterprise has grown to encompass a wide variety of activities, participants, and purposes. Currently, nearly half of all high school students and about one-third of college students are involved in vocational programs as a major part of their studies. Perhaps as many as 40 million adults—one in four—engage in short-term, postsecondary occupational training (Darkenwald and Kim 1998). These individuals come to vocational education for different reasons, participate in different ways, and take different paths afterwards. In an era in which strong skills and lifelong learning are rewarded, the nature and impact of student experiences in vocational education could have important implications for the nation's workforce and America's place in the global economy.

Federal efforts to improve the quality and availability of vocational programs are articulated, most recently, in the Carl D. Perkins Vocational and Technical Education Act (Perkins III).[2] Passed in October 1998, this act reflects both continuity with previous vocational legislation and some substantive departures, specifically in funding and accountability. As policymakers begin to consider further changes in law—in anticipation of reauthorization scheduled for 2004—they will be examining vocational education as a field in transition, prompted by sweeping changes in federal, state, and local education and training priorities. This final report of the congressionally-mandated National Assessment of Vocational Education (NAVE) provides information to enable new policy to be responsive to these shifts.

A. Key Findings

The National Assessment of Vocational Education (NAVE) was charged with evaluating the status of vocational education and the impact of Perkins III. After more than three years of study NAVE finds that:

- Vocational education has important short- and medium-run earning benefits for most students at both the secondary and postsecondary levels, and these benefits extend to those who are economically disadvantaged.

- Over the last decade of academic reforms, secondary students who participate in vocational programs have increased their academic course taking and achievement,

[1]The first federal legislation supporting vocational education was the Smith-Hughes Act of 1917.

[2]Other federal programs, such as student financial aid, tax credits, and the Workforce Investment Act, help provide individuals with *access* to occupational training at the postsecondary level; the Perkins Act provides support to institutions and programs.

making them better prepared for both college and careers than were their peers in the past. In fact, students who take both a strong academic curriculum and a vocational program of study—still only 13 percent of high school graduates—may have better outcomes than those who pursue one or the other.

- While positive change is certainly happening at the high school level, secondary vocational education itself is not likely to be a widely effective strategy for improving academic achievement or college attendance without substantial modifications to policy, curriculum, and teacher training. The current legislative approach of encouraging "integration" as a way to move secondary vocational education toward supporting academics has been slow to produce significant reforms.

In large part, the pace and path of improvement are hampered by a lack of clarity over the program's fundamental purpose and goal. Perkins III offers a conflicted picture of federal priorities for vocational education improvement—academic achievement, technical skills, high school completion, postsecondary enrollment and degree completion, and employment and earnings. Without a clearer focus for the federal investment—amounting to about 5 percent of local spending—around which to rally the commitment and efforts of vocational teachers, counselors, and administrators, ongoing program progress in any particular direction is less certain.

This overall assessment draws on evidence addressing three key NAVE questions:

1. How does, or can, vocational education improve the outcomes of secondary students who choose to enroll in vocational and technical programs?

2. What is the nature and impact of vocational education at the sub-baccalaureate level, and what is its relationship to current workforce development efforts?

3. Is the policy shift from set-asides and legislative prescription to flexibility and accountability likely to improve program quality and student outcomes? How do special populations fare?

1. How does, or can, vocational education improve the outcomes of secondary students who choose to enroll in vocational and technical programs?

Perkins III and its legislative predecessors have largely focused on improving the prospects for students who take vocational education in high school, a group that has historically been considered low achieving and noncollege-bound.[3] However, students who partici-

[3]About 62 percent of Perkins funds are spent at the high school level.

pate most intensively in vocational programs—those we call occupational "concentrators"[4]—are actually quite diverse; certainly, about a quarter never enroll in postsecondary education, but a substantial number (18 percent) go on to complete at least a baccalaureate degree. The vocational courses most high school students take improve their later earnings but have no effect on other outcomes that have become central to the mission of secondary education—such as improving academic achievement or college transitions (Table 1). Whether the program as currently supported by federal legislation is judged successful depends on which outcomes are most important to policymakers.

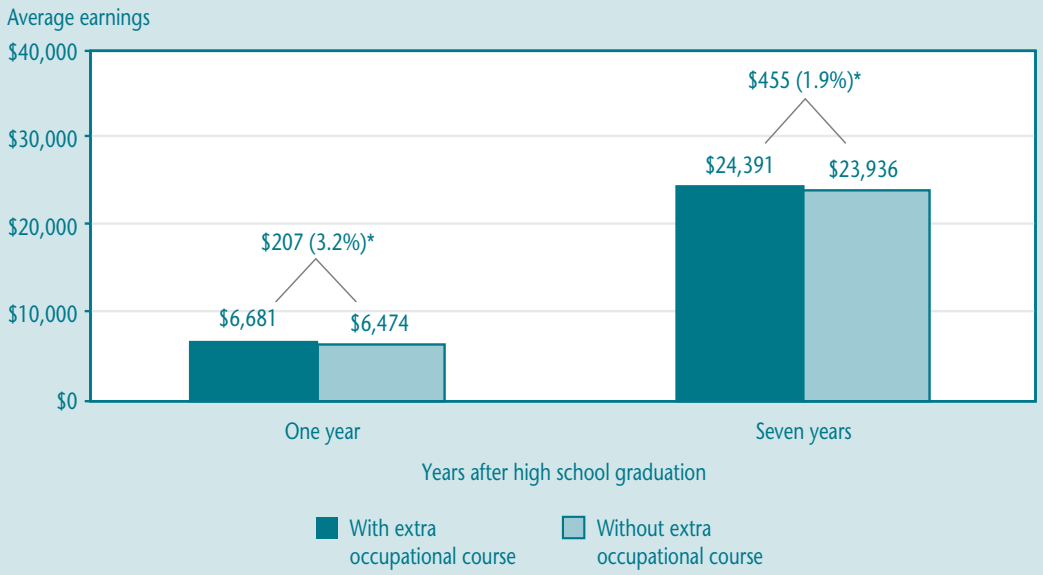
- ***The short- and medium-term benefits of vocational education are most clear when it comes to its longstanding measure of success—earnings.*** Several recent studies highlight the positive average effects of vocational course taking on annual earnings, measured just over a year or several years after high school graduation. Seven years after graduation, for example, students earned almost 2 percent more for each extra high school occupational course they took. That translates into about

[4]Occupational concentrators are defined as students who earn at least 3.0 occupational credits in one program area.

$450 per course, based on average earnings of about $24,000 (Figure 1); the benefit would be $1,350 more for the 45 percent of all high school graduates who take at least three occupational courses, including the quarter of graduates who concentrate their course taking in one program area (occupational concentrators).

Figure 1

Average Earnings of 1992 High School Graduates, with and without an Extra Occupational Course: First Year and a Half and Seventh Year after Graduation



SOURCE: Agodini, Deke, et al. forthcoming. Analysis of NELS 1994 and 2000 Follow-up Surveys.
*Indicates that the effect is significantly different at the 0.05 level, two-tailed test.

To varying extents, the studies indicate that these benefits extend to the large group of high school graduates who enroll in postsecondary education and training, to both economically and educationally disadvantaged students, to those with disabilities, and to both men and women. In addition, students who complete the "New Basics" academic curriculum as well as a concentration of occupational courses—about 13 percent of all graduates—earn more than similar students who complete the New Basics and little vocational education.[5] However, the studies are more mixed on whether secondary vocational courses benefit the one-quarter of high school graduates who never enroll in postsecondary education, a group that has historically been the focus of vocational policy. There are also some important

[5]The "New Basics" academic curriculum, as measured here, is equivalent to four years of English or language arts, and three years each of math, science, and social studies. Many states are moving to this standard for core high school graduation requirements.

caveats to these earnings results. The evidence that vocational education increases wages—a proxy for a "better" job—is weaker, and it is likely that the benefits will continue to decline over time.

- ***Students in vocational programs of study have significantly increased their academic course taking and achievement over the last decade, although gaps remain.*** During the 1990s, successive groups of occupational concentrators took more, and more rigorous, academic courses along side their vocational curriculum (Table 2). By the end of the decade, the academic credit gap between them and students who took little or no vocational education had narrowed substantially. However, there were still differences between concentrators (51.1 percent) and non-concentrators (60.3 percent) in the proportion who completed the extensive New Basics core academic curriculum and larger gaps in the percent that completed a rigorous college preparatory curriculum (29.2 percent versus 46.2 percent).

Table 2

Percentage of Occupational Concentrators and Non-concentrators Completing the "New Basics" Core Academic Curriculum and a College Prep Curriculum: 1990 and 2000

Academic Indicator	1990	2000	Percentage Change
"New Basics" academic curriculum[1]			
Occupational concentrators	18.5	51.1	+32.6*
Non-concentrators	45.7	60.3	+14.7*
Gap between concentrators and nonconcentrators	-27.1	-9.2	-17.9*
College prep curriculum[2]			
Occupational concentrators	10.1	29.2	+19.1*
Non-concentrators	35.9	46.2	+10.3*
Gap between concentrators and nonconcentrators	-25.8	-17.0	-8.8*

SOURCE: Levesque 2003b. Analysis of High School Transcripts.

[1] New Basics = Four years of English and three years of math, science, and social studies.

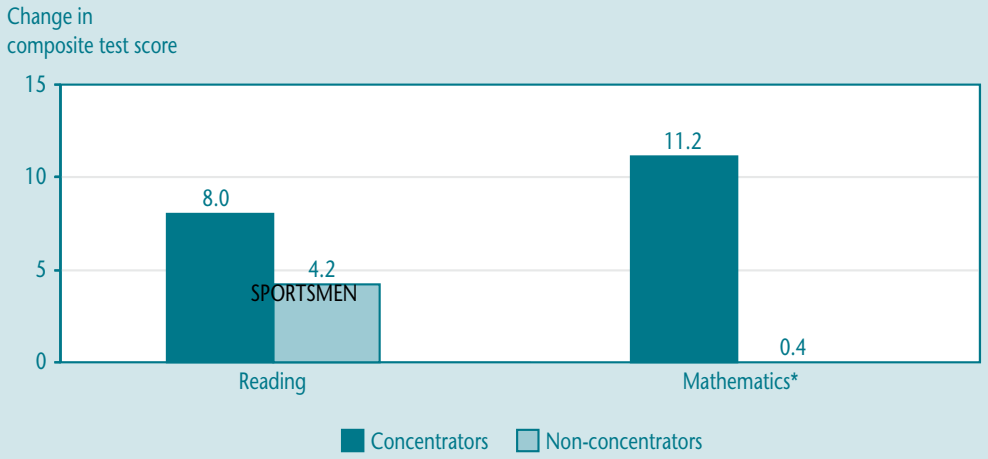
[2] The "college-prep curriculum" is defined as earning 4.0 or more credits in English; 3.0 or more credits in mathematics at the algebra 1 or higher level; 2.0 or more credits in biology, chemistry, or physics; 2.0 or more credits in social studies, with at least 1.0 credit in U.S. or world history; and 2.0 or more credits in a single foreign language (see Levesque et al. 2000).

*Statistically significant at the 0.05 level.

More importantly, occupational concentrators also made substantial progress on academic achievement (Figure 2). The National Assessment of Educational Progress (NAEP) 12th-grade test scores of occupational concentrators increased during the decade, by about 8 scale points in reading and 11 scale points in math. Students who took little or no vocational education increased their reading achievement by about 4 points in reading and experienced no increase in math achievement. As a result of these trends, the gap between concentrators and non-concentrators remained roughly stable in reading, while the gap in math achievement was reduced significantly.

Figure 2

Change in NAEP 12th-Grade Test Scores for Concentrators and Non-concentrators: Reading 1994–1998 and Mathematics 1990–2000



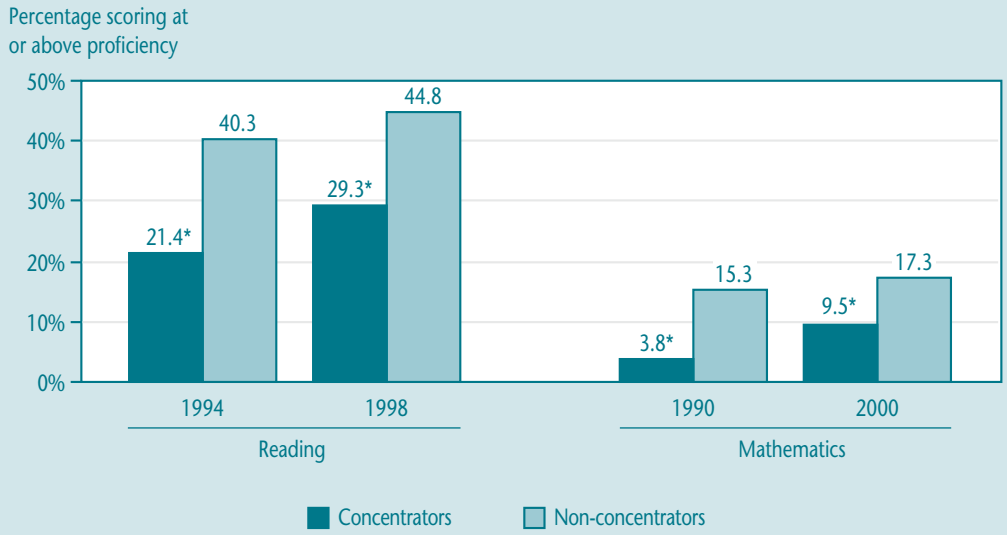
SOURCE: Levesque and Paret forthcoming. Analysis of 12th-Grade NAEP Assessments.

*Difference between concentrators and non-concentrators is statistically significant at the 0.05 level.
NOTE: All increases over time are statistically significant at the 0.05 level except for non-concentrators in mathematics.

The NAEP assessments indicate that there has been substantial progress, but more work is necessary to raise the achievement levels of all students, particularly those in vocational programs. Most importantly, occupational concentrators are far less likely than non-concentrators to be proficient in reading or math, as defined by their most recent NAEP test scores (Figure 3). If proficiency on the 12th-grade NAEP assessments is associated with readiness for postsecondary education or success in the labor market, then these figures suggest a greater focus on academic improvement is needed.

Figure 3

Percentage of Concentrators and Non-concentrators Scoring at or above Proficiency on NAEP 12th-Grade Test Scores: Reading 1994–1998 and Mathematics 1990–2000



SOURCE: Levesque and Paret forthcoming. Analysis of 12th-Grade NAEP Assessments.

*Difference between concentrators and non-concentrators is statistically significant at the 0.05 level.
NOTE: All increases over time are statistically significant at the 0.05 level except for non-concentrators in mathematics (1990–2000).

- ***There is little evidence that vocational courses contribute to improving academic outcomes.*** The noted improvements in academic performance are likely due to higher academic graduation requirements and increased emphasis on academic reforms. Both analyses of high school student data and randomized controlled studies indicate that, on average, vocational courses and programs do not themselves "add value" to academic achievement as measured by test scores. Not surprisingly, substituting additional academic courses for occupational courses does raise achievement. Moreover, although there is mixed evidence that vocational education reduces dropping out of school, the more rigorous studies suggest there is no effect.

- ***Postsecondary transition rates have increased; vocational courses neither hurt nor help most students' chances of going on to college but are associated with a shift from earning a bachelor's degree to earning an associate's degree or certificate.*** Vocational education has long been stigmatized as for the "noncollege bound" or as a deterrent to college, although NAVE finds that neither of these concerns is well founded. The best available national trend data indicate that higher proportions of occupational concentrators are moving on to some form of postsecondary education or training, although they still participate overall at lower rates than do other students and in particular in

four-year colleges and universities (Table 3). Many concentrators enroll later, so that by seven years after graduation nearly three-quarters versus 90 percent of all other students have participated to some extent.

Table 3
Percentage of 1982 and 1992 High School Graduates Who Enrolled in Postsecondary Education or Training within Two Years after Graduation: 1984 and 1994

Curriculum Path	1982 Graduates	1992 Graduates	Percentage Change	1992 Graduates in Four-Year Institutions
All students	57.3	73.0	+27.4	41.4
Occupational concentrators	41.5	54.7	+31.8	21.3
College preparatory	95.6	93.2	-2.5	73.3
Other/General	61.2	69.1	+12.9	30.4

SOURCE: Levesque et al. 2000. Analysis of the High School and Beyond Longitudinal Study (HS&B) and the National Education Longitudinal Study (NELS).

However, improvements in postsecondary enrollment do not appear related to vocational course taking. Studies of graduates in both the early and later 1990s indicate that vocational education itself has no effect on whether students ever attend postsecondary education or training.[6] Moreover, among those who enroll, high school vocational education is associated with a lower likelihood of completing a bachelor's degree program and a corresponding higher likelihood of completing an associate's degree or certificate program.

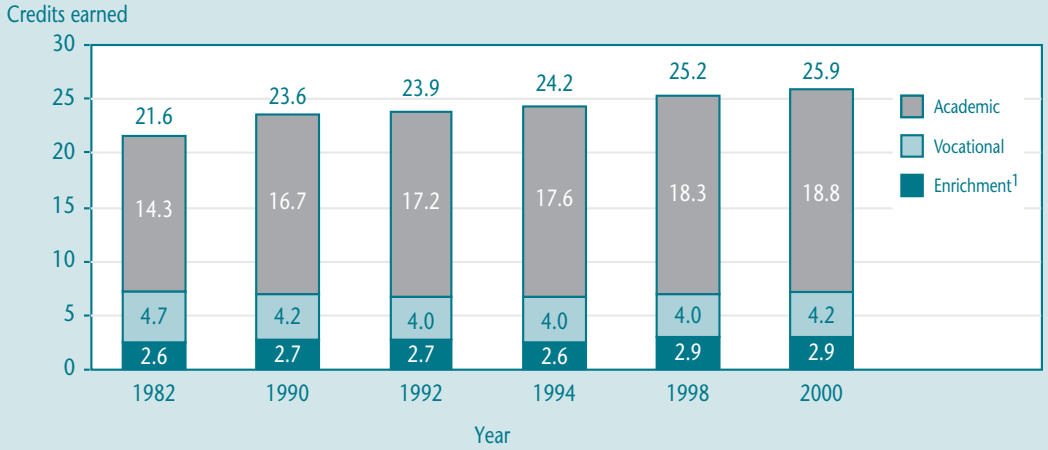
- ***Secondary vocational education is a large component of high school course taking and serves a diverse set of students, but it is an increasingly smaller share of the overall curriculum.*** Nearly every student (96.6 percent) leaves high school having taken some vocational education, although the extent of student involvement varies. By almost any measure, participation remained stable during the last decade after an earlier period of decline, withstanding schools' ongoing focus on academic

[6]Some students enroll in high school vocational education *because* they do not plan to attend college, so a negative relationship between vocational courses and postsecondary education might be expected. However, even controlling for college plans and other student characteristics, vocational courses have no effect, on average, on postsecondary enrollment.

improvement. While there was little change in the amount of vocational course work taken by high school students during the 1990s, students earned more academic credits, thus lowering vocational education's share of the overall high school curriculum—from 21.8 percent in 1982 to 17.8 percent in 1990 to 16.2 percent in 2000 (Figure 4). Still, high school students earn, on average, more credits in vocational education (4.0) than in math (3.4) or science (3.1).

Figure 4

Average Credits Earned by High Schools Students, by Type of Course Work: 1982–2000



SOURCE: Levesque 2003b, 2003c. Analysis of National High School Transcripts.

[1]Includes courses such as art, music, and driver's education.

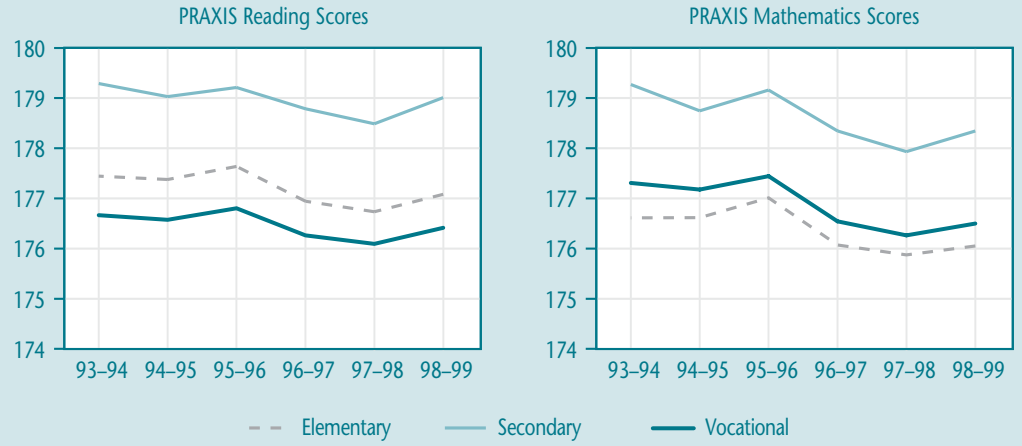
Those who participate most intensively—occupational concentrators—are a varied set of students. However, those who have disabilities or are male, come from lower-income or rural schools, or arrive at high school with low academic achievement participate more substantially than do other students. These patterns were generally stable during the last decade, although vocational education appeared to attract more academically talented students during the 1990s. Less progress was made on overcoming gender differences in vocational course participation.

- ***The Perkins quality improvement strategies may be too vague to drive change without clear direction.*** Perkins III carried over a variety of strategies from Perkins II—such as integration of academic and vocational instruction, an all aspects of the industry emphasis, linkages between secondary and postsecondary programs, collaboration with employers, and expanding the use of technology. Several of these strategies, including integration, are ill defined and that may be a barrier to wider implementation. In addition, little is known about their effectiveness in improving

student outcomes. Perhaps more importantly, the practices are potentially targeted toward different outcomes: for example, technology might be expected to affect occupational-technical skills, integration to affect students' academic achievement. The list does not reflect a focused purpose to the federal investment.

- ***Improving teacher quality will be important if vocational education is expected to alter its mission.*** Teachers have the most direct impact on instruction and the earnings benefits for many vocational students may suggest that this instruction is valued in the labor market. However, federal legislation over the past decade has tried to guide vocational education toward providing greater support for academic achievement; student outcomes and program implementation suggest that these efforts have been less successful. Current vocational teachers are less likely than academic teachers to have bachelors' degrees and many do not feel they have received sufficient professional development on the key strategy of integration. Moreover, prospective high school vocational teachers (in vocational teacher training programs) score lower on basic reading and writing tests than do those preparing to be elementary school teachers and lower on math tests than other secondary teachers (Figure 5). Substantial investments in new recruitment and in-service training approaches may be required if federal legislation continues to make supporting academic achievement a priority for vocational education.

Figure 5
PRAXIS (Preservice) Reading and Mathematics Scores, by Type of Prospective Teacher: 1994–1999



SOURCE: Cramer forthcoming. Analysis of Praxis Test Scores.
NOTE: These results are for the paper-based version of the test.

- ***Tech-Prep was a catalyst for certain vocational reform activities but, because few schools implement it as a comprehensive program of study, it is now playing less of a distinctive role.*** Efforts to promote both integration of academic and vocational instruction and articulation between secondary and postsecondary education were stimulated by the Tech-Prep Education Act in Perkins II. However, 12 years later, few schools implement Tech-Prep as a structured program with at least two years of clearly linked high school course work and at least two years of related postsecondary course work (the "two-plus-two" design). The most recent estimates suggest that about 10 percent of Tech-Prep consortia, representing 5 percent of Tech-Prep students overall, may be promoting this comprehensive two-plus-two approach. In 2001, only seven states reported that they require local grantees to implement Tech-Prep as a distinct program.

  More typically schools implement individual components of the Tech-Prep model—maintaining articulation agreements, providing professional development on integration to academic or vocational teachers, or improving career guidance and planning. Many of these activities are becoming part of secondary vocational education more broadly, and little change has occurred at the postsecondary level to accommodate Tech-Prep students. As a result, Tech-Prep efforts now overlap substantially with those of regular vocational education.

2. What is the nature and impact of vocational education at the sub-baccalaureate level, and what is its relationship to current workforce development efforts?

Given the labor market value of college credentials, "lifelong learning," and flexibility in skills, the role of sub-baccalaureate vocational education is increasingly important. Many different types of students, with different intentions, cross the doors of community colleges and other Perkins-eligible postsecondary institutions; even with this diversity, the institutions provide services from which most participating students benefit. Relatively low rates of retention are a concern, however, not only because federal policy has long encouraged postsecondary degree completion as a strategy for maintaining American economic competitiveness, but also because individual participants would reap much greater earnings advantage from staying long enough to earn a credential. An emphasis on degree completion may be at odds with the shorter-term training emphasized by the Workforce Investment Act (WIA). But at least so far, integration of decision-making and services between Perkins and WIA has been limited in most states.

- ***There are significant economic returns to postsecondary vocational education, with the greatest benefits for those who earn a credential.*** As was true at the secondary level, vocational education in community colleges appears to produce a substantial positive effect on earnings for the vast majority of participants. There are differences in these returns, depending on how much course work is completed (Table 4). Some postsecondary vocational participants do benefit from a year's worth of vocational course taking even without attaining a credential, earning between 5 and 8 percent more than do high school graduates with similar characteristics. However, much higher economic rewards go to those who pursue significant amounts of postsecondary vocational education and earn a degree or certificate; female associate's degree holders, for example, earn 47 percent more than similar students with a high school degree and males earn 30 percent more. These results represent the average effects of earning postsecondary degrees. Although many economists argue that the effects vary widely by occupational field, the available data did not permit fields of study to be analyzed separately.

Table 4
Adjusted Percentage Difference in Earnings between Postsecondary Vocational Program Participants and High School Graduates, by Gender: 2000

	Percentage Difference in Earnings[1]	
Returns to:	**Male**	**Female**
One year of postsecondary vocational courses	8.0*	5.4
Credential		
Institutional certificate	6.5	16.3*
Vocational associate degree	30.2*	47.0*

SOURCE: Bailey, Kienzl, and Marcotte forthcoming. Analysis of the National Education Longitudinal Study (NELS).

[1]Numbers are the actual earnings returns in percentages, calculated by taking the anti-log of the regression coefficients; tests of statistical significance were computed using the original regression coefficients.

*Statistically significant at the 0.05 level.

- ***Fewer than half of postsecondary vocational participants seeking a degree or certificate take enough courses to earn a credential.*** Like their academic counterparts, many vocational participants leave sub-baccalaureate institutions and programs having completed few courses; more than two-thirds of vocational majors complete the equivalent of a year or less of course work within a five-year time period. Even among those who enroll with the goal of earning a degree

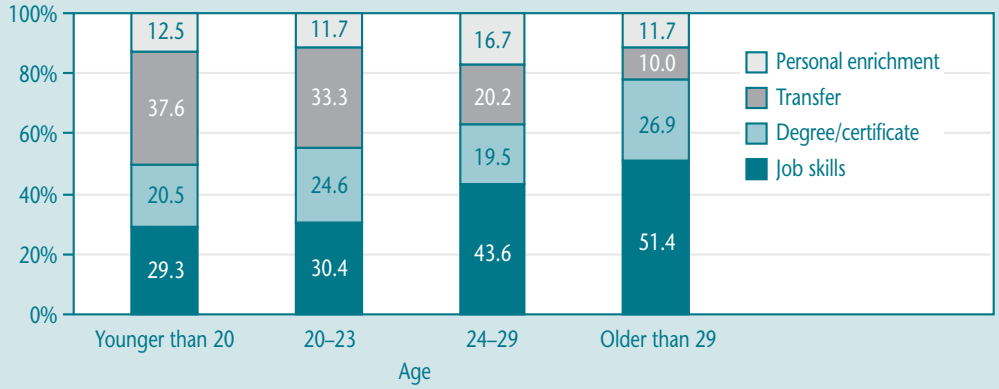
or certificate, fewer than half actually complete a credential of any kind (Figure 6).[7] Taking student goals and characteristics into account, the completion rate for vocational majors is similar to that of academic majors, although vocational participants are more likely to earn a shorter-term credential (e.g., certificate) than they originally set out to attain. The relatively low completion rate among postsecondary vocational students is consistent across categories of students, including those in special population groups.

- ***Postsecondary vocational education serves a large and diverse population with varied expectations.*** About one-third of all students in undergraduate postsecondary education are considered to be in postsecondary vocational programs. These sub-baccalaureate vocational students vary in age, income, work experience, and previous college activity. Not surprisingly, then, they enroll with different goals—to get an associate's degree or institutional certificate, to transfer and pursue a bachelor's degree, to enhance their job skills, or to engage in personal enrichment activities; older students are more interested in obtaining job skills while younger students are more likely to aim for a credential (Figure 7). To accommodate this diversity, community colleges have to be particularly flexible institutions. Perkins III funds, which represent just 2 percent of vocational education expenditures in public two-year and less-than-two-year colleges, can be used to support almost any part of the enterprise.

- ***Community colleges have had limited involvement in early implementation of WIA, citing both low emphasis on training and reporting requirements as disincentives.*** Early WIA implementation, during a period of economic expansion and job growth, primarily emphasized the development of new procedures and the delivery

[7]The comparable completion rate for students entering four-year postsecondary programs seeking bachelor's degrees is 61.9 percent; that is, almost two-thirds of students who enter these longer degree programs actually earn a credential of some kind (including less than a baccalaureate degree), compared to about half of students who enter shorter-term vocational associate degree programs.

Figure 7
Percentage Distribution of Postsecondary Vocational Students, by Age and Reported Primary Goal: 1996



SOURCE: Silverberg et al. 2002. Analysis of the National Postsecondary Student Aid Study, 1996.
NOTE: Percentages may not add to 100.0 due to rounding.

of employment information over the kinds of training activities Perkins-eligible institutions typically provide. There is some evidence that, with the recent economic downturn, both the availability of training vouchers and policy interest in training are increasing, but the lack of coordination between WIA and Perkins accountability measures reportedly still leads to substantial burden for participating institutions.

3. *Is the policy shift from set-asides and legislative prescription to flexibility and accountability likely to improve program quality and student outcomes? How do special populations fare?*

The funding and accountability changes enacted under Perkins III have been partially successful in addressing policymakers' objectives, although much is still in development. Local grantees are receiving larger dollar amounts and case studies suggest they are able to distribute secondary Perkins funds to more schools, outcomes consistent with the goal of directing more money to the local rather than state levels. However, both the traditional ways in which grantees use their funds and early implementation of the higher stakes accountability system forecast at best slow change in vocational program quality. Despite serious commitment among state administrators, technical measurement and data quality problems hinder widespread use of performance data for program management at either the state or local levels. Given these deficiencies, it seems unlikely that, in the short run, the accountability system will have particular benefits for special population students, especially since identifying and collecting data on these students has proven to be particularly difficult for state and local officials. The effects of eliminating targeted set-asides intended to promote gender equity is currently unknown.

- ***The new law succeeded in sending a higher share of funds to the local level.*** The average size of local grants grew substantially between Perkins II and Perkins III (approximately 34 percent for secondary and 26 percent for postsecondary grantees) (Table 5). These increases cannot be fully explained by increases in federal appropriations that go to state grants (just over 15 percent) or a reduction in the number of grants awarded.

Table 5
Grant Amounts Awarded to Secondary and Postsecondary Recipients: 1992 and 2001

Grant Amounts	1992	2001	Difference	Percentage Change
Perkins appropriations for state and substate grants (in thousands)[1]	$954,259	$1,100,000	$145,741	15.3
Average secondary substate grant amount				
Current dollars	76,238	101,813	25,575	33.5
Real dollars (2001)	96,670	101,813	5,143	5.3
Average postsecondary substate grant amount				
Current dollars	226,019	285,645	59,626	26.4
Real dollars (2001)	286,592	285,645	-947	-0.3

SOURCE: White et al. forthcoming. Analysis of National Survey of State Directors of Vocational Education, Fiscal Data 1992 and 2001.

[1]Overall Perkins appropriations included other programs that on average increased 7.3 percent between 1992 and 2001.

- ***Flexibility provisions are popular, but may be weakening the targeting of funds to high-poverty communities.*** Nearly 30 states at the secondary level and 20 at the postsecondary level use at least one of the flexibility provisions in Perkins III. The most common choice is the newly established "reserve fund" provision, which allows states to award 10 percent of local funds to programs in rural and other areas without using the poverty-weighted legislated formula. Perhaps as a result, the dollar advantage of high-poverty districts has declined since Perkins II (Table 6).

  Perkins III also included several options to allow states to better coordinate federal vocational funds and activities with those of other federal programs. Only one state submitted to ED a "consolidated" plan to integrate vocational education with other education programs, and 12 states submitted "unified" plans in which they described their expected activities under some combination of the Perkins, WIA,

Table 6
Average Perkins Grant Amounts, Adjusted for Student Enrollments, by LEA Poverty Level: 1992 and 2001[1]

Poverty Level[3]	Grant Amount per Secondary Student[2] 1992	2001	Percentage Change
High-poverty school districts	$51	$53	3.9
Medium-poverty school districts	28	32	14.3
Low-poverty school districts	32	41	28.1
All school districts	32	40	25.0

SOURCE: White et al. forthcoming. Analysis of National Survey of State Directors of Vocational Education, Fiscal Data 1992 and 2001, and NCES, Common Core of Data (CCD).

[1]Averages based on 29 states for which data were available in both 1992 and 2001 and where more than 80 percent of grantee recipients in a state had an NCES ID.

[2]These calculations adjust for the number of 9th- through 12th-grade students in a district to isolate the effects of targeting from those of enrollments.

[3]Poverty level is measured by the number of students in a district qualifying for the federal free or reduced-price lunch program: Low poverty = 0 to 9 percent of students in a district qualify; medium poverty = 10 to 49 percent of students; and high poverty = 50 percent or more of students.

Adult Education, and Vocational Rehabilitation laws. Although, under the ED Flex program, states received the authority to waive Perkins requirements, states generally did not exercise that authority.

- ***Implementation is progressing, but so far the performance measurement system is rarely viewed as a tool for program improvement.*** The current system, perhaps the first legislated accountability effort with significant "teeth," is still evolving and state officials have demonstrated a serious commitment to it. However, several factors limit its likely impact on vocational programs and student outcomes in the next few years: (1) difficulty collecting data, (2) lack of validity or reliability of many adopted performance measures, and (3) inconsistent approaches to data collection and reporting within states. Certainly, the current system cannot provide a reliable, national picture of vocational education performance. Overall, the quality and reach of the Perkins accountability measures vary considerably by indicator, by state, within state, and sometimes even within local grantees' programs. It is therefore unsurprising that relatively few states or districts use the performance data for consequential decision-making.

- ***Although there have been some cutbacks in staffing dedicated to special population services, the full effects on programs and students are unknown.*** Even with the elimination of the gender equity set-asides and coordinator requirements, many states continued to support these efforts, though the amount of staff time seems to have declined. In 2001, 23 states reported having at least one gender equity coordinator working full- or part-time, but case studies suggest these figures represent reductions from Perkins II. There were fewer observed effects at the local level, with other funding sources sometimes making up for the loss of Perkins gender equity grants. There were cutbacks in targeted programs and services in some communities, but how these might affect student outcomes cannot be known for several more years.

B. Options for Future Directions[8]

Despite the current strengths of the vocational education system supported by Perkins III, there remain ongoing challenges for further improvement. Policymakers may wish to consider a variety of ways—encompassing broad or more specific strategies—in which to shape the course of these improvements.

1. Broad Strategies for Promoting Change

There are several possible options that have implications for the structure of a new or revised law. These broad strategies share a common goal of providing a clearer focus to federal priorities.

Transform Perkins into a program with clear, focused, and limited objectives.

The Perkins legislation authorizes a stream of funds that provides wide latitude to state and local grantees in terms of implementation and goals. The law's reporting requirements reflect the historical accumulation of purposes that have been laid out for vocational education: improving students' academic and technical skills, enhancing high school completion, promoting postsecondary enrollment and completion, and ensuring successful labor market entry and retention.[9] All of these, it could be argued, are worthy objectives for federal policy to address at either the high school or college level, or both.

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[8]Perkins III requires the NAVE to provide "findings and recommendations resulting from the assessment" (Section 114(c)).

[9]Since federal vocational education legislation was enacted in 1917, the law has responded to changing needs and acquired new objectives. Initially, it was a way to prepare immigrant and rural populations to work in factories and on farms. At some point it became a form of training that might appeal to less academically oriented students, perhaps helping to keep them in school by engaging them in activities most relevant to future employment. Over time vocational education was supported as a strategy to keep the United States internationally competitive, by delivering advanced technical training to meet the needs of an increasingly high-tech economy. More recently, vocational education has been promoted as a strategy to enhance academic learning and provide a clearer pathway to success in college.

However, it is reasonable to question the capacity of any single law or any single program strategy to succeed on all of these fronts. The diffuse nature of federal priorities for this stream of funds both reflects and contributes to ambivalence among policymakers and educators about what "problem" is being addressed by the Perkins legislation, and impedes efforts to develop clear, focused, and tested education interventions designed to ameliorate the identified problem.

The federal investment could be more effective if directed toward a narrower set of goals around which program improvement strategies and accountability systems could be developed. There are some choices in moving in that direction:

- ***Emphasize immediate goal of education or workforce development.*** Decision-makers may want to weigh whether vocational education, or the activities the Perkins legislation supports, should most directly and immediately contribute to:

  - Education, in which the emphasis is primarily on learning academic or occupational skills (or both) while enrolled in school; or

  - Workforce development, in which the emphasis is primarily on job and other post-school outcomes.

  These various objectives are certainly interrelated and clarifying the priorities does not imply that vocational education cannot also have other benefits. Studies clearly link higher levels of learning and of educational attainment to success in the workplace (see NAVE Interim Report [Silverberg et al. 2002]). The language in Perkins III and of vocational advocacy groups suggest that effective technical skills rest on a strong foundation of academic proficiency. The question is, however, which of these goals is most critical for Perkins-funded activities? A focus is important for the federal role of promoting continuing improvement.

- ***Separate the high school and postsecondary components of the Perkins Act versus keeping them joined in the structure of the law.*** In some sense, secondary and postsecondary vocational education share many qualities. Both are elective choices for students rather than a required curriculum. Both serve an increasingly diverse set of students, who have widely varying purposes for participating and hopes for what they will accomplish. When secondary vocational education was clearly a program for developing occupational skills and preparing for immediate employment, the strategies at the two levels were similar. However, that may no longer be the case. Because the mission of high schools and community and technical colleges differ, as do the challenges they face, policymakers may decide that federal vocational education should play a different role at each level. For example, although

federal policy may charge secondary vocational education with reinforcing high schools' learning objectives, policy may choose to more clearly tie postsecondary vocational education to workforce development outcomes.

Establishing separate policies and goals for vocational education at the two levels need not undermine the current federal emphasis on developing clear pathways from high school to postsecondary education. On the contrary, with two separate titles or sections, the law could more clearly articulate the specific responsibilities of secondary and postsecondary institutions to create and maintain those pathways.

Eliminate Tech-Prep as a separate title, folding its key activities into postsecondary institutions' responsibilities.

Tech-Prep has spurred some important efforts but has not lived up to its promise of creating rigorous programs of technical study. The Tech-Prep title of the Perkins Act has become a funding stream like the larger state grant title in Perkins, allowing local consortia to supplement vocational education or other efforts associated generally with the spirit of the law (e.g., career development). Rarely are funds focused on developing the well-defined two-plus-two (2+2) programs that early Tech-Prep advocates promoted: integrated high school academic and vocational curricula that are "articulated"—linked through credit transfer agreements—to postsecondary programs. Instead, integration and articulation have been implemented more on a course-by-course basis. Moreover, these two key components of Tech-Prep have become more common priorities for vocational education generally, diminishing the distinctive role that Tech-Prep efforts might play. Finally, there is some evidence that Tech-Prep funds are not as well targeted to high-poverty areas as are the formula-driven basic grant funds under the Perkins Act.

Despite these limitations, Tech-Prep remains the catalyst for some initiatives and strategies that many consider worth preserving. Two, in particular—convening local partners to collaborate on postsecondary transition issues and updating articulation agreements—could instead become required activities for postsecondary Perkins grantees, many of whom already play this role as part of Tech-Prep consortia.[10]

This strategy could, in effect, focus the Perkins-funded efforts of eligible postsecondary institutions on serving their younger students (those transitioning from high school) rather than on the older adult population. Such an emphasis might be warranted, because the younger students are less likely to be on a stable trajectory toward labor

[10]Requiring postsecondary institutions to be responsible would not preclude other Perkins institutions—secondary districts, high schools, area vocational centers, adult centers—from playing major roles in these activities, as is appropriate. However, designating the lead institutions in law may help ensure that the activities are a focus of funded efforts.

market success: they have more limited work histories and previous college or job training experience, and there is some evidence that earning a credential matters more for them than for older students. Given that Perkins grants represent about 2 percent of local community college spending on occupational education, a focus for federal funds on younger students might also strengthen current efforts to develop rigorous cross-level course sequences, pathways, or programs of study.

Streamline accountability requirements to align with the more focused objectives.

The current accountability provisions in Perkins III require secondary and postsecondary grantees to report on a broad array of student outcomes, both those that students achieve while in school (academic achievement, occupational-technical skill development, school completion) and those that define their paths after they leave (further education or training and employment). There are two reasons for reducing the number of indicators:

- ***To limit burden and improve performance data quality.*** Many states are finding it burdensome to meet all of the reporting obligations and their current performance measures and data collection approaches have limited validity and reliability, impeding reliance on them for significant program management decisions. Improvements in data quality and use are more likely if state and local grantees could concentrate their efforts on a smaller set of indicators.

- ***To focus program improvement activities.*** The accountability system is intended to motivate states, districts, and postsecondary institutions to manage their programs more effectively. A more limited set of performance indicators, closely aligned to policymakers' priorities for the federal investment, could encourage more targeted improvement efforts.

2. Specific Strategies for Improved Performance

Although there are broad changes to the structure of the law that policymakers could pursue, there are also individual practices and strategies new legislation could promote that might improve particular outcomes (Table 7). Ideally, one set of strategies would be emphasized, tied to a clear declaration of federal priorities. However, the strategies could also be implemented in combination.

These specific approaches—summarized in Table 7—draw to a large extent on current research and evaluation analyses, most conducted under the NAVE.

Table 7
Overview of Specific Strategies to Improve Vocational Program Performance, by Federal Priority

Federal Priority for Vocational Education	Improvement Strategies
Secondary Level	
Enhance academic achievement	▶ Make priority more explicit in law ▶ Support curriculum development strengthening academic content of vocational courses ▶ Limit funding to programs with proven academic content ▶ Invest in focused teacher training
Raise occupational and technical skills in high schools	▶ Require content and performance standards for vocational courses ▶ Promote aligned end-of-course technical assessments ▶ Include rewards and sanctions
Improve employment and earnings, particularly for noncollege-bound students	▶ Encourage implementation of vocational program course sequences ▶ Promote work experience programs
Postsecondary Level	
Improve employment and earnings	▶ Focus improvement efforts on younger students ▶ Work with high schools to give students realistic sense of college, training, and job requirements ▶ Place more emphasis on support services

3. Closing

Vocational education, increasingly known as career and technical education, is a long-standing program whose place in American education continues to evolve. The broadening of its goals, the ongoing diversity of participants, and the changing education and labor market climate in which it operates, suggest vocational education is a flexible option for schools and students.

With this flexibility comes some challenges, however. At the high school level, participation in vocational education is an elective choice that faces increasing pressure from emphasis on academic improvement. For both secondary and postsecondary vocational education, the wide range of participants and objectives raises a question about how

effective a role federal policy plays and whether that policy can or should promote a clearer set of priorities. This final NAVE report is designed to contribute to that discussion, by providing the most up-to-date and comprehensive assessment of vocational education in the United States and of the effects of the Carl D. Perkins Vocational and Technical Education Act of 1998.

1. Introduction

Eighty-five years ago the federal government first committed to vocational education as a national priority.[1] Since then, the enterprise has grown to encompass a wide variety of activities, participants, and purposes. Currently, nearly half of all high school students and about one-third of college students are involved in vocational education programs as a major part of their studies. Perhaps as many as 40 million adults—one in four—engage in short-term postsecondary occupational training (Darkenwald and Kim 1998). These individuals enter vocational education for different reasons, participate in different ways, and take different paths after completing their courses and programs. In an era in which strong skills and lifelong learning are rewarded, the nature and impact of students' experiences in vocational education could have important implications for the nation's workforce and America's place in the global economy.

Federal efforts to improve the quality and availability of vocational programs are most recently articulated in the Carl D. Perkins Vocational and Technical Education Act.[2] Passed in October 1998, this act reflects both continuity with previous vocational legislation and some substantive departures. As policymakers begin to consider further changes in law—in anticipation of the scheduled reauthorization—they will be examining vocational education as a field in transition, prompted by sweeping changes in federal, state, and local education and training priorities. This final report of the National Assessment of Vocational Education (NAVE) provides information to enable new policy to be responsive to these shifts.

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[1]The first federal legislation supporting vocational education was the Smith-Hughes Act of 1917.

[2]Other federal programs, such as student financial aid, tax credits, and the Workforce Investment Act (WIA), help provide students with access to occupational training at the postsecondary level; Perkins provides support to institutions and programs.

A. 1998 Perkins Act

Signed into law on October 31, 1998, the Carl D. Perkins Vocational and Technical Education Act (referred to as "Perkins III") represented almost four years of deliberations over how to modify federal vocational legislation. Previous periods of legislative change had focused on particular policy concerns (Table 1.1). Over time, these changes increasingly promoted educational equity, improvements in program quality, and a shift away from vocational education's origins as a separate program or "track." These objectives were also evident in the Perkins III debates, but in passing the 1998 law, Congress sought to address additional concerns and to do so in different ways.

1. Key Changes

Congress made several important substantive changes to the Perkins Act in 1998. These changes reflected certain themes or priorities for education and the role of the federal government in education policy:

- ***Increased emphasis on academics:*** Continuing the trend begun in earlier legislation, Perkins III further focused attention on improving the academic performance of vocational students; the stated purpose of the 1998 law suggests that federal vocational education funds be directed toward improving both academic and vocational-technical skills, and new accountability provisions require state and local grantees to ensure that vocational students are held to the same academic standards as other students.

- ***Greater flexibility in the use of funds:*** The new law released state and local agencies from certain federal rules governing how Perkins grants were allocated and used for program improvement; set-aside funding streams for gender equity were eliminated, as were most other funding distribution requirements weighted toward "special population groups" (e.g., students with disabilities).

- ***More funds directed to the local level:*** Congress wanted a larger share of funds to be allocated to local programs, expecting that additional resources would reach the classroom and could affect student outcomes more directly; elimination of the set-asides allowed a higher proportion of Perkins funds to pass to local districts, schools, and postsecondary institutions.

- ***Creation of a "higher-stakes" accountability system:*** Although states had been expected to gather information on the outcomes of vocational students since 1990, Perkins III imposed requirements for state reporting to the U.S. Department of

Table 1.1
Overview of Previous Federal Vocational Legislation

Periods of Vocational Legislation	Policy Objectives and Tools
1917–1963	Provide trained workers for growing semi-skilled occupations and retain more students in secondary education through: ▶ Expansion of separate vocational schools and programs. ▶ Funds for basic maintenance of programs. ▶ Focusing on agriculture, industry, and home economics for high school students.
1963–1968	Improve and expand vocational education through: ▶ Separate funds for innovative programs, research, and curriculum development. ▶ Support for construction of regional or area vocational schools. ▶ Support for adult training and retraining (postsecondary vocational education). ▶ Encouragement to states to promote vocational education equity and better service to disadvantaged students.
1968–1990	Improve vocational education and facilitate access through: ▶ Periodic encouragement to states to distribute some funds by community's economic need and levels of student disadvantage. ▶ Establishment and expansion of set-aside funds to serve special population groups.[1] ▶ Prohibiting the use of most federal funds for maintenance of programs. ▶ Continuation of set-aside funds for program improvement.
1990–1998	Expansion of equal access and emphasis on academic quality through: ▶ Introducing intrastate and intradistrict funding rules: distribution to agencies and schools weighted by special populations. ▶ Promoting "integration" of academic and vocational education and "all aspects of the industry." ▶ Set-aside funds for new programs linking secondary and postsecondary vocational education: Tech-Prep. ▶ Requirement that states develop performance standards.

SOURCE: Millsap and Muraskin 1992; Boesel et al. 1994a.

[1]The precise number of groups regarded as "special populations" expanded over two decades.

Education (ED), including disaggregated reporting for special populations; the new law also introduced potential rewards and consequences for states that do and do not improve student performance.

- ***Improved coordination with related initiatives:*** After debating but discarding the option of combining the two laws, Congress enacted Perkins III immediately after passing the Workforce Investment Act (WIA); both laws were intended to provide opportunities to integrate postsecondary education institutions into state and local systems for workforce development and job training.

2. Continuity with the 1990 Perkins Act Amendments

Congress did not alter the basic structure of the Perkins Act in the 1998 reauthorization, however. Perkins remains primarily a formula grant program.[3] Funds are still distributed to states based on population counts, while states allocate grants to local secondary and postsecondary institutions based largely on the numbers of low-income students the institutions serve. States continue to have discretion to determine the proportion of their state grant that will be allocated to secondary versus postsecondary vocational education.

Moreover, Perkins III continued to emphasize the major program strategies reflected in the 1990 Perkins amendments (Perkins II). Specifically, the law promotes the following:

- Integration of academic and vocational education, by implementing coherent sequences of academic and vocational and technical instruction.
- Broadening the focus of vocational education content to emphasize industries and careers in place of entry-level, job-specific training.
- Strengthening the links between secondary and postsecondary education through Tech-Prep and other strategies.

3. Unresolved Policy Debates

While the strategies outlined in the 1998 Perkins Act can be interpreted as reflecting policymakers' current priorities and guidance for vocational education, the legislation did not settle fundamental questions that have been raised about its future role in the

[3]The Perkins Act contains some set-asides (e.g., 1.25 percent of appropriations for grants to Native American tribes and tribal organizations), which are awarded by the U.S. Department of Education through a competitive grant program. In addition, funds allocated to states by formula under Title II of Perkins III, the Tech-Prep Education Act, can be awarded to local grantees using either a formula or a competitive grant process.

education and training systems. Both in congressional deliberations before passage of Perkins III and in continuing discussions in the education community, several issues remain unresolved that could have implications for reauthorization:

- ***At what education level is specialized vocational education appropriate?*** More and more, the priorities of high schools and policymakers have turned to improving students' academic achievement and encouraging their entry into college, with this emphasis strongly supported by the recent No Child Left Behind Act of 2001, which reauthorized the Elementary and Secondary Education Act. Perhaps as a result, vocational programs have become a smaller share of the high school curriculum (see Chapter 2). At the same time, postsecondary institutions, particularly community colleges, have assumed a much larger role in preparing students for careers. Given this trend, the limited federal resources available for high schools, and the costs of keeping both secondary and postsecondary vocational programs up-to-date, some question whether vocational education as a program of study belongs in high school or whether this type of specialization should occur at the college level.

- ***Whom should secondary vocational education serve and what is its purpose?*** With its emphasis on preparing students for the labor market, vocational education has long been supported, in part, as an important strategy for high school students with weaker academic skills or little interest in pursuing college credentials. Over the last decade, however, federal legislation and most state agencies have promoted the notion of vocational education as preparation for high-tech, high-skill careers, those in which the academic skills required may be substantial. Consistent with that objective, states and local programs have sought to attract more academically talented students into vocational education programs. Although current law defines vocational education as preparation for careers requiring less than baccalaureate degrees, this definition is increasingly at odds with the goals and interests of participating students and the actual paths they take after high school (see Chapter 2).

- ***What is the federal role in postsecondary vocational education?*** Many interpret the Perkins Act as providing a set of strategies designed to improve secondary vocational education. Policymakers have mostly been concerned with secondary vocational education, providing little direction for the specific goals or problems federal Perkins funds are expected to address at the postsecondary level. Currently, Perkins grants can be used for a wide array of offerings that eligible institutions provide and to support varied learning and training objectives pursued by those who participate

in postsecondary vocational education.[4] One issue policymakers may consider is whether Perkins can, or should, address all of these populations and purposes or whether federal resources should be more clearly focused.

- ***Should vocational education be "education" or "training"?*** For the past decade, the Perkins Act has emphasized teaching about "all aspects of the industry"—focusing on a comprehensive understanding of the industry rather than just specific skills needed for an entry-level job. Although state officials are increasingly interested in broadening vocational programs into what they call "career clusters," much of vocational education has been organized around traditional occupational categories (Hoachlander 1998). In the past few years, many schools have been attracted to—and policymakers have touted—vocational programs offered by high-tech firms such as Microsoft and Cisco; to some, this emphasis on product-specific skill training seems inconsistent with the broader approaches promoted in federal policy. At the postsecondary level, the provisions of Perkins have signaled some preference for occupational programs that offer for-credit courses and culminate in an associate degree (education), as compared to short-term, noncredit training courses. But some groups who report growth in noncredit enrollments have wondered whether this federal emphasis is appropriate.

- ***What is the best way to help special populations?*** Deep concerns that different groups have uneven access to high-quality education, including vocational education, initially led policymakers to set aside funds for underserved groups. In 1998, that approach was replaced by one that focused on holding grantees accountable for improving the educational outcomes of all vocational education participants, including targeted special populations. However, it may be many years before the full effects of performance reporting will be known.

These debates are as much philosophical as empirical, reflecting diverse opinions about the role of federal vocational education policy and the specific objectives it addresses. Research and data can contribute to and inform these discussions but are not likely to settle them. Federal policymakers may choose to address these issues directly or leave them up to the discretion of state and local agencies, as is currently the case.

[4]Under Perkins III, however, federal funds can no longer be used to support programs consisting of a single course or those that do not include "competency-based learning" (i.e., most leisure- or personal interest-related programs could not receive Perkins support).

B. Context for Evaluating Federal Support for Vocational Education

Each time Congress has considered federal aid for vocational education the outcome reflected an understanding of the economic and educational concerns of the time and the nature of the federal role in education. Legislative actions often have sought to push vocational education in new directions. The upcoming reauthorization of Perkins III is likely to be no exception. Several factors are likely to shape policymakers' deliberations over new vocational education legislation (see the NAVE Interim Report to Congress [Silverberg et al. 2002] for a more detailed discussion of these issues).[5]

Education, labor market, and funding trends suggest shifts in policy priorities.

Vocational education has long straddled the education and job-training systems, secondary and postsecondary institutions, and local, state, and federal agencies. Vocational legislation is therefore always influenced by larger education, labor market, and policy developments.

- ***High schools increasingly emphasize academic reform and college preparation.*** Due to the poor performance of seniors on national and international proficiency tests, declining graduation rates, and high rates of college remediation, many have been concerned about the academic achievement of high school students. Partly in response, nearly every state has set higher academic standards for high school graduation, and many have begun to include exit exams. The challenge many students, including some in vocational programs, face in meeting the new standards has raised questions about the role of high school courses lacking clear academic focus. These concerns also have led to a hypothesis that student enrollments in elective courses such as vocational education will decline sharply.

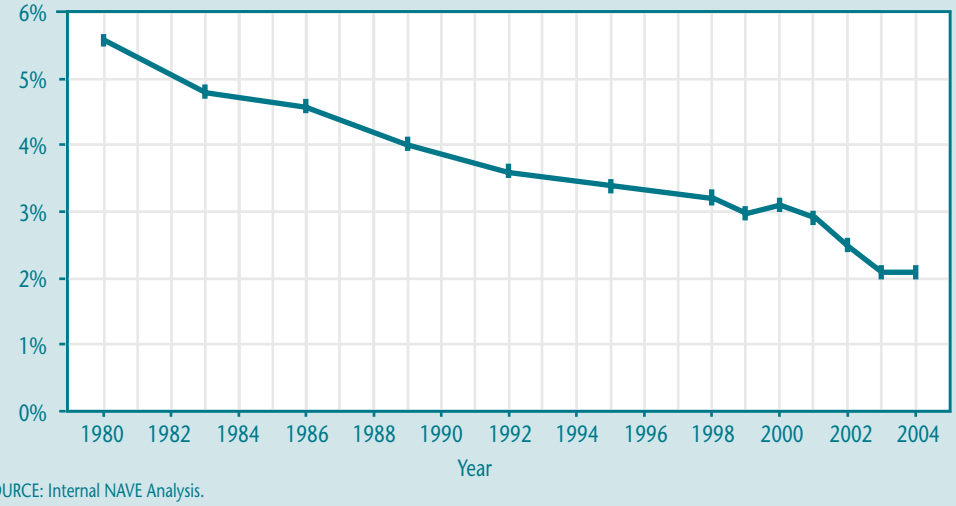
- ***Good jobs require at least some postsecondary education.*** Both high- and low-paying jobs are available in the labor market, but a college credential of some kind is needed for most better-paying jobs. Employment growth in occupations requiring a vocational associate degree is projected to be higher (30 percent) than overall employment growth (14 percent) through 2008 (Erard forthcoming). Thus, demand for postsecondary vocational education is likely to remain strong.

[5]The NAVE Interim Report to Congress (2002) is available at http://www.ed.gov/rschstat/eval/sectech/nave/reports.html.

- ***For the past 20 years, Perkins has represented a declining share of federal education budgets, but it is still the largest single source of U.S. Department of Education (ED) funds spent on high schools.*** Perhaps because the primary objective of vocational education has not appeared well-aligned with other priorities, appropriations for the Perkins Act and its predecessors have not kept pace with either inflation or the expansion of other ED programs and the Department's overall budget. In fiscal year 1980, funding for vocational education represented about 6 percent of total ED appropriations, while in 2004 it represented less than 3 percent (Figure 1.1). Despite its relative declining share, Perkins III remains the largest single source of federal education funds used to support high schools. Comparing dollars spent at the high school level, vocational education appears to be of equal federal priority as the combined funding of other programs focused on raising academic achievement (Title I) and preparing students for college (TRIO) (Figure 1.2).[6]

Figure 1.1

Perkins Vocational Education Funding (Appropriations) as a Percentage of Total U.S. Department of Education Budgets: 1980–2004

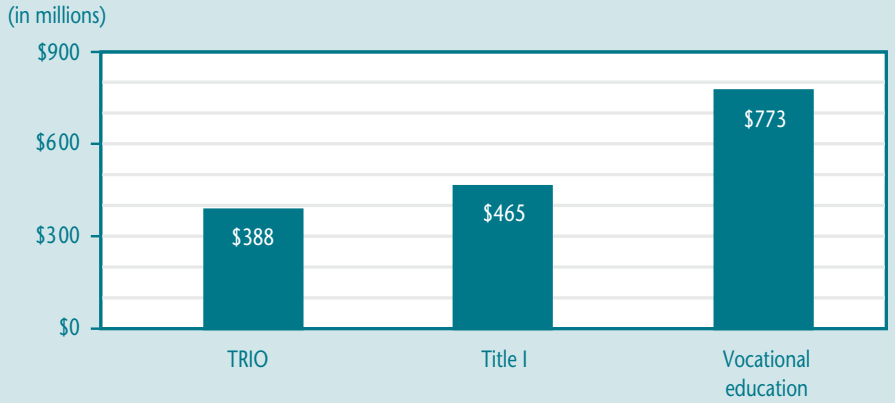


SOURCE: Internal NAVE Analysis.

[6]In the case of the Perkins Act and Title I, the amount of federal funds spent on high school activities is determined by state and local agencies. Estimates of national high school spending for these programs were calculated using the most recently available evaluation data regarding the relative split of funds across education levels.

Figure 1.2

Selected U.S. Department of Education Spending on High Schools: FY 2001



SOURCE: Internal NAVE Analysis.

NOTE: Figure reflects estimated portion of total appropriations spent on high schools.

Current vocational policy attempts to promote many diverse goals and objectives.

Evolving priorities clearly have moved federal support for vocational education toward fulfilling a broader set of objectives than training students for work in factories and on farms after high school, the original aim of federal vocational legislation at the turn of the 20th century (Table 1.2). The stated purpose of the 1998 Perkins III Act is to enhance not only the vocational and technical skills of students who choose to participate in vocational education but also their academic skills. The law's accountability provisions suggest that vocational education is also expected to contribute to high school completion, entry into postsecondary education and training, postsecondary degree completion, and employment and earnings. Programs funded under the law are expected to increase participation and success in programs leading to nontraditional training and employment. Finally, to some extent, Perkins III continues the emphasis on special populations that began several decades earlier, shifting from a concern about access to one of improved performance for the identified groups.

While all of these outcomes are desirable, it is unclear whether they can be achieved simultaneously. Since federal policy currently allows states, school districts, and postsecondary institutions to decide which objectives are the highest priority for Perkins spending, the law provides great flexibility—but little focus—for the direction of program improvement. In contrast, Title I of the recently enacted No Child Left Behind Act, with funding in 2003 approximately 10 times greater than that of the Perkins Act, is clearly focused on one core mission: raising the academic achievement of disadvantaged students.

Table 1.2
Perkins III Legislated Outcomes

Programs funded under Perkins III are expected to contribute to the following outcomes:

- Vocational and technical skills
- Academic skills
- High school completion
- Placement in, retention in, and completion of postsecondary education or training or military service
- Placement or retention in employment
- Participation in and completion of vocational programs leading to nontraditional training and employment
- Improved performance of all groups, including special populations

SOURCE: P.L. 105-332, the Carl D. Perkins Vocational and Technical Education Act of 1998, Sections 2 and 113.

Several initiatives targeted to vocational education are beginning to move it in new directions.

In most communities, the vocational education of today looks far different than it did a generation ago. Particularly over the past decade, federal legislation and emerging trends have encouraged the field to develop courses and programs reflecting the wider set of missions, and to target a broader group of students. Aimed primarily at the secondary level, many of these efforts are intended to reduce the stigma traditionally associated with vocational education and to encourage broad career preparation as a beneficial option for all students.[7] Among these vocational initiatives and strategies are the following:

- ***High Schools That Work (HSTW)***. Originally designed by the Southern Regional Education Board (SREB) as a strategy to improve the academic achievement of "career-bound" students, HSTW emphasizes raising academic graduation requirements for all students, students' completion of either an academic or career major or both, new guidance and advising systems, and tutorial assistance for students who

[7]These initiatives were supported in various ways by the federal School-to-Work Opportunities Act of 1994. This grant program provided states and local partnerships of educators, employers, and community groups with "venture capital" to initiate strategies that help students develop better educational foundations for long-term career preparation. Although the legislation has expired, many School-to-Work tenets can be found in the "new vocational" strategies.

need extra help. According to the SREB, HSTW began with 28 sites in 13 states in 1987, while in 2002 it was adopted as either a vocational education or comprehensive school reform strategy by more than 1,100 schools in 36 states.

- ***Career academies.*** Developed in the 1970s as a dropout prevention strategy targeted to students who are at risk of school failure, career academies now serve a more diverse set of goals and students. Academies are typically implemented as a school-within-a-school program of two to four years that offers students a sequence of vocational and college-preparatory academic course work organized around broad career themes. In collaboration with an academy business partner, students may obtain work experiences, take field trips, or complete school assignments based on a designated career theme. The results from a 1999 survey suggest that as many as one-quarter of U.S. high schools offered at least one career academy (Levesque forthcoming).

- ***Skill standards and certification.*** For nearly a decade, efforts to develop national skill standards and portable credentials for many occupations have received federal, industry, and labor support.[8] These standards were intended to identify the skills required in particular fields and provide a focus for efforts to update vocational curricula. Employers were expected to value the certificates that students earned in the upgraded vocational programs. While the results of the National Skill Standards Board have been limited so far, some national, state, and regional industry groups have produced their own sets of standards, which local programs report using. The findings from a 1998 survey of School-to-Work partnerships nationwide suggest that 14.6 percent of secondary schools offered students in some vocational programs certificates denoting mastery of skills identified by industry groups at the partnership, regional, state, or national level (Hulsey, Van Noy, and Silverberg 1999).

  Skill standards and certifications recently have emerged in both new ways and fields. Perhaps the most prominent new offerings in vocational education are the high-tech Cisco Academies and Microsoft A+ and Novell certification programs, which emphasize the high-wage, high-demand end of vocational education offerings. These programs have grown in popularity and are increasingly attracting a more academically talented group of high school students to vocational education (Haimson and Van Noy forthcoming).

[8]The National Skill Standards Board (NSSB), created as part of the federal Goals 2000 Act (1994), was charged with developing a voluntary national system of skill standards, assessments, and certifications. Even before the NSSB was formed, the U.S. Departments of Education and Labor funded 22 industry groups with similar objectives.

- ***Tech-Prep articulation.*** Tech-Prep was originally designed as a four-year program of related academic and vocational course work spanning the last two years of high school and first two years of community college in order to prepare students for technical careers. Rarely implemented in this form, many schools instead have focused on establishing articulation agreements that allow students to earn college credit for high school vocational course work that meets college standards; in some cases, articulation is leading to the upgrading of high school vocational courses (Hershey et al. 1998). Since 1990, Perkins legislation has set aside specific funds to support Tech-Prep. The most recent evidence suggests that nearly half of all high schools offer something they call "Tech-Prep" (Levesque forthcoming).

The result of these varied vocational efforts is a field that continues to evolve. New terminology abounds; in fact, many in the field now refer to it as "Career and Technical Education (CTE)" rather than vocational education. Several program strategies overlap; many are implemented in combination or as separate options within the same school or program. Despite the federal definition of vocational education as "preparation for careers requiring less than baccalaureate degrees," many of the newer offerings are designed to attract students who intend to pursue a four-year degree after high school.

The different initiatives are aimed toward different objectives: some are designed to improve the academic achievement of vocational students, some to improve their occupational and technical skills, others to promote students' entry into college or their acquisition of general employability skills recommended by the Secretary's Commission on Achieving Necessary Skills (SCANS). Certainly, vocational education course offerings have moved beyond "shop" class, and most communities can point to at least one "high-profile" partnership program with employers, usually in a high-technology or high-demand field such as health care or information technology. Policymakers will need to consider whether these developments, discussed in more detail in the next chapters, are of sufficient extent and impact to be leading vocational education on a consistent path toward meeting federal priorities.

C. National Assessment of Vocational Education

Evidence on the nature of vocational education and the context in which it operates is an important source of policy information. As was true with previous vocational legislation, Perkins III directed the secretary of education to complete an "independent evaluation and assessment of vocational and technical education programs under this Act" (Section 114(c)(3)). The National Assessment of Vocational Education (NAVE) is intended to support the broad goals of improving vocational education and to provide Congress with information to guide reauthorization of the Perkins Act.

1. Independent Advisory Panel

Following earlier legislative tradition, Perkins III directed the secretary of education to appoint an Independent Advisory Panel to provide advice on conducting NAVE. Such a panel was selected in mid-1999 and included employers, secondary school and district administrators, representatives of postsecondary institutions, state directors of vocational education at both the secondary and postsecondary levels, union representatives, education and workforce development policy experts, and researchers with experience in relevant fields.

This panel met on seven occasions to (1) identify the key policy and research questions NAVE will address, (2) review the analytic framework and study designs, and (3) receive and help interpret results from NAVE analyses, including those described in this final report. Perkins III required the panel to submit to Congress and the secretary of education its own independent analysis of NAVE findings and recommendations. The Advisory Panel's report to Congress has been transmitted in a separate document.

2. Research Objectives and Questions

As a key source of policy information, NAVE examined the status of vocational education across the country and, to the extent possible, the early impacts of the 1998 law on vocational education practice. The research agenda took into account the wide range of topics Congress mandated in Perkins III (Section 114), including (1) implementation of state and local programs; (2) the impact of changes in federal funding formulas; (3) teacher quality and teacher supply and demand; (4) student participation in vocational education; (5) academic and employment outcomes; (6) employer involvement and satisfaction with vocational education programs; (7) education technology and distance learning; and (8) the effect of accountability requirements on program performance.

At a broader level, however, NAVE was guided by three key policy issues (Table 1.3).

Table 1.3
Key NAVE Research Questions

How does, or can, vocational education improve the outcomes of secondary students who choose to enroll in vocational and technical programs?

Perhaps the most important issue for vocational education is who participates at the secondary level and how well they fare in school and beyond. In an era of accountability for results, policymakers are interested in how students participate and whether their involvement contributes to key outcomes, such as academic skills, success in college, and employment and earnings. NAVE examined the participation trends and effects, as well as the role of federal policy in efforts to improve vocational education. This analysis included evaluating the extent to which federal strategies for improving program quality are reflected in school and classroom practice and the relationship between vocational education and school reforms under way in many states and communities.

What is the nature and impact of vocational education at the sub-baccalaureate level, and what is its relationship to current workforce development efforts?

Given the labor market value of college credentials, "lifelong learning," and flexibility in skills, the role of sub-baccalaureate vocational education has been of increasing policy interest. NAVE assessed patterns of enrollment and participation in postsecondary vocational education and their relationship to student outcomes and impacts. In examining the current and potential influence of federal vocational policy, NAVE also evaluated (1) the role that postsecondary vocational education is playing in state and local workforce development strategies and (2) the extent to which the 1998 federal Workforce Investment Act is having an effect on the delivery of postsecondary vocational education.

Is the policy shift from set-asides and legislative prescription to flexibility and accountability likely to improve program quality and student outcomes? How do special populations fare?

For the past two decades, federal policy has focused on serving those most at risk for school failure, commonly termed "special populations." Perkins III represented a major shift in direction, eliminating both set-aside funds for certain special population groups and regulatory requirements that local funds be targeted to serve the highest concentrations of special populations. In their place is an increased emphasis on accountability, including the requirement that states track the progress of special population groups. NAVE assessed whether (1) increased flexibility seems to be changing educational priorities or practices, (2) special populations are being helped or hurt as a result, and (3) accountability requirements are being taken seriously and appear to be improving the quality of vocational education for all students.

3. Evaluation Strategies and Limitations

Addressing the key vocational research and policy questions required a set of interrelated but distinct studies (see NAVE Study Reports at the end of the report). These studies involved the use of diverse data collection and analysis methods, including qualitative case studies, national surveys, state administrative databases, and both descriptive statistics and sophisticated econometric estimation of program effects. This report integrates information from both these NAVE-funded assessments and relevant, high-quality studies sponsored by other organizations and federal agencies.

NAVE's short time frame and the nature of Perkins III ultimately affect the particular studies undertaken and the ways in which the information can be used. First, due to the resources needed to conduct national surveys, student transcript collection and coding, and student assessments, NAVE often had to rely on existing data for national estimates. Available national data, mostly from the National Center for Education Statistics (NCES) of the Department of Education, are often not as current or detailed as needed for timely decision making about policy. The late release of data from several sources delayed important NAVE analyses and the submission of this report.

Second, as with other studies of federal legislation, NAVE operated at a time when many of the important changes in Perkins III had just begun. Most states opted for "transitional plans," which, in effect, deferred implementation of Perkins III provisions until fall 2000. Given the reporting dates for NAVE, new data had to be collected primarily in 2001 and therefore reflect very early efforts made in response to new legislative provisions.

Finally, several factors make it challenging to identify the specific impact of this law on vocational education implementation or to disentangle the influences of Perkins III from those of other state and local initiatives. The Perkins Act contributes funds to a broad, ongoing state and local education program; the legislation does not designate a clearly defined or discrete model program. In addition, a significant share of the nation's secondary districts and sub-baccalaureate institutions do receive, and have received for some time, grants under the act, making implementation differences between Perkins II and Perkins III difficult to detect (see Chapter 5).

Despite these limitations and challenges, however, NAVE analyses provide the most up-to-date and comprehensive assessment of vocational education in the United States and of the effects of the Carl D. Perkins Vocational and Technical Education Act of 1998.

D. Overview of this Final Report to Congress

This report presents a synthesis of evidence on the implementation and outcomes of vocational education and of the 1998 Perkins Act, as outlined below (Table 1.4). It examines questions about the effectiveness of vocational education in improving student outcomes, the consequences of new funding and accountability provisions for programs and participants, the implementation and quality of vocational education, and the extent of its alignment with other reform efforts. The report also provides options for the future direction of vocational education legislation.

Table 1.4
Outline of Final Report

Chapter	Title	Description
1	Introduction	Overview of the Perkins Act, the context for assessing federal support for vocational education, the National Assessment of Vocational Education (NAVE), and this final report.
2	Secondary Vocational Education	Organization of vocational education at the secondary level; participation, outcomes, and effects; influence of Perkins III improvement strategies on vocational education implementation and coordination with education reforms.
3	Postsecondary Vocational Education	Organization of vocational education at the postsecondary level; participation, outcomes, and effects; influence of Perkins III improvement strategies on implementation efforts and coordination with the workforce development system.
4	Tech-Prep Education	Organization of Tech-Prep; participation and outcomes; and implementation efforts.
5	Program Management: Funding and Accountability	Effects and uses of Perkins funding provisions and status of new accountability systems promoted under Perkins III.
6	Conclusions and Potential Future Directions for the Perkins Act	Summary of key themes from the final report and recommendations for policymakers.

2. Secondary Vocational Education

Vocational education has long been a part of the American high school experience. From its origins as an alternative to the college preparatory curriculum, vocational education has become for most high school students a set of electives to be taken alongside required academic courses. As these academic requirements grow in number, rigor, and importance, the role of secondary vocational education—and of federal vocational education policy—may also be evolving.

This chapter aims to examine this issue by first describing how vocational education is organized (Section A) and then addressing four key research questions:

1. Has the nature of vocational course taking changed and who participates in it? (Section B)
2. How is vocational education implemented and to what extent are federal improvement strategies reflected in classroom practice and school organization? (Section C)
3. How well aligned is vocational education with other education reform efforts? (Section D)
4. How do vocational students fare both in and after high school, and does vocational education contribute to student outcomes? (Section E)

key findings ▶

▶ Key Findings ◀

KEY FINDINGS

▶ ***Over the last decade, vocational students have made significant academic progress—both in their achievement and the number of credits earned—although there is little evidence that vocational course taking is responsible for these promising outcomes.***

During the 1990s, students who pursued a focused vocational program of study ("occupational concentrators") took more, and more rigorous, academic courses, and their average 12th-grade reading and math skills increased. By the end of the decade, the academic course gap between them and students with little or no vocational education had narrowed to less than 1.0 Carnegie credit. However, these improvements are likely due to higher academic graduation requirements and emphasis on upgrading academic courses. Analyses of high school student data and recent randomized controlled studies suggest that, on average, vocational courses and programs do not in themselves contribute or "add value" to academic achievement. Although the evidence is mixed, the most rigorous evaluations indicate that vocational education also has no effect on high school completion.

▶ ***Vocational courses probably neither hurt nor help students' chances of entering or completing postsecondary education.***

Vocational education has long been stigmatized as for the "noncollege bound" or as a deterrent to college, although NAVE finds neither concern well-founded. Higher proportions of occupational concentrators have enrolled in college over the last several decades. Moreover, analyses suggest that participating in vocational education has no effect on whether a student engages in postsecondary education or training, partly because many vocational students do enroll, just later than other students. However, vocational course taking is associated with a shift from earning a baccalaureate degree to earning an associate's degree.

▶ ***The benefits of vocational education are clearer when examining its most longstanding measure of success—earnings.***

Recent studies indicate a positive average effect of vocational education on annual earnings, measured just over a year or several years after high school graduation. Seven years after graduation, for example, students earned almost 2 percent (about $450) more for each additional high school vocational course they took, or just over $1,350 more for occupational concentrators. These benefits appear to extend to students who go to college, to those who have economic and educational disadvantages, to those with disabilities, and to both men and women; studies differ over whether there are earnings advantages for students who *never* attend college, an increasingly small group. Students who complete the "New Basics" academic curriculum *as well as* occupational courses earn more than similar students who complete the "New Basics" and little vocational education. However, the evidence is mixed on whether earnings benefits come from students' working more hours or from higher wages. Moreover, the medium-run earnings advantage of high school vocational education is not likely to persist over time.

▶ ▶ ▶

- ***Secondary vocational education is a large component of high school course taking but an increasingly smaller share of the overall curriculum.***

  Nearly every student (96.6 percent) leaves public high school having taken some vocational education, although the extent of involvement varies. By almost any measure, participation remained stable during the last decade after a period of decline in the 1980s, withstanding schools' ongoing focus on academic improvement. While the amount of vocational course work taken changed little during the 1990s, students earned more academic credits, thus lowering vocational education's share of the overall high school curriculum—from 21.8 percent in 1982, to 17.8 percent in 1990, to 16.2 percent in 2000. Still, high school students earn, on average, more credits in vocational education (4.2) than in math (3.5) or science (3.2).

- ***Vocational education students represent a diverse group, including those from special populations.***

  Vocational education serves an array of students, with most from the middle range of academic and income advantage. However, those who have disabilities or are male, come from lower-income or rural schools, or enter high school with low academic achievement participate more substantially than do other students. These patterns were generally stable during the last decade, although vocational education appeared to be attracting relatively more academically talented students. There was less progress on overcoming gender differences in the particular vocational courses students choose.

- ***Implementation of Perkins improvement strategies is progressing, with wide variation in their intensity.***

  Perkins III carried over program improvement strategies from Perkins II, several of which are being emphasized in high schools and area vocational centers nationwide. For example, articulation agreements and technology upgrades are growing. Integration of academic and vocational education remains a priority at the state level (accounting for nearly one-fifth of state leadership funds nationally) and is increasing locally, but is still neither broadly nor deeply implemented.

- ***Vocational education is responding to state academic reforms, with more consensus and action at the state than local levels so far.***

  Emphasis on academic reforms is prompting changes in vocational education in some states and communities. Many states have developed vocational curriculum guidelines, which increasingly include academic content. Local practice has not yet been broadly affected due partly to the lack of consensus among vocational teachers about their responsibility for improving academic outcomes. Other effects of reform include (1) more use of vocational course time for academic test preparation; (2) reports of reduced vocational enrollments where "high-stakes" assessments have recently been implemented; and (3) efforts by vocational administrators and initiatives (e.g., High Schools That Work) to promote smaller learning communities, alternative scheduling, and the elimination of the general education track. Moreover, Perkins remains the primary federal legislation that supports collaboration between secondary and postsecondary institutions, with the goal of encouraging more students to make successful transitions into college.

A. Organization of Vocational Education at the Secondary Level

Vocational education at the secondary level is a large and complex system. Like academic subjects, vocational courses are available at various grade levels and include both introductory and advanced offerings. But far more so than academic subjects, secondary vocational education is provided in diverse institutions. Understanding where and how vocational courses are offered provides important context for interpreting who participates in vocational education, how it is implemented, and what are its outcomes.

Secondary vocational education is provided in a variety of settings.

Because nearly all public high school graduates earn credits in vocational education, it follows that most secondary schools offer at least some form of career learning. Recent evidence suggests that at least 11,000 high schools,[1] more than two-thirds of such schools nationally (Table 2.1), provide at least one of the common occupational programs. These schools include the following:

- ***Close to 9,500 comprehensive high schools:*** Comprehensive high schools typically have an academic focus, but some have large vocational programs. Charter schools, many of which have career or occupational themes, are also included in this category.

- ***About 1,000 vocational high schools:*** These schools emphasize vocational instruction but also offer the full set of academic courses required in a high school curriculum; students spend a full day at the school.

- ***About 800 area or regional vocational schools (AVSs):*** They usually provide only vocational instruction; students typically attend part-time and receive their academic instruction at their home high school.

Compared to comprehensive high schools, both types of vocational schools are considered to offer higher-quality occupational instruction because of their superior equipment and facilities and the greater depth and breadth of training these specialized institutions provide. However, most secondary vocational education is provided in comprehensive high schools (Boesel et al. 1994b, p. 3), with some courses also offered in middle schools.[2]

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[1]This figure represents an undercount of the total proportion and number of schools offering vocational education because the survey on which it is based asked about only 28 occupational programs; some schools may provide only other forms of vocational education (e.g., general home economics), as described below.

[2]The law allows funds to be spent on vocational education in seventh or eighth grade. However, such a small proportion of Perkins grants (less than 1 percent) are allocated to middle school programs that vocational offerings below the high school level are not a focus of NAVE analysis.

Table 2.1
Percentage of Public High School Institutions, by Type, Locale, and Percentage Offering Selected Occupational Programs: 1999

Locale	Percentage Distribution of Public High School Institutions			Percentage of Schools Offering Vocational Education[1]
	Comprehensive High School	Vocational High School	Area or Regional Vocational Center	
Overall	89.2	4.6	6.2	66.5
Urban	84.2	10.3	5.5	72.9
Suburban	89.7	4.4	5.9	63.9
Rural	90.3	3.1	6.6	66.5

SOURCE: Hudson and Shafer 2002. Fast Response Survey System, "Survey on Vocational Programs in Secondary Schools," 1999.

[1]Measured as providing at least one vocational program in any of 28 occupational areas.

Secondary vocational education encompasses three types of courses.

Regardless of where it is offered, secondary vocational education comprises three types of courses (top of Figure 2.1):

- ***Specific Labor Market Preparation ("occupational education"):*** Teaches skills and knowledge required in a particular occupation or set of related occupations—such as health, business, and food service and hospitality—included in the 10 broad occupational program areas defined by the National Center for Education Statistics (NCES), some with subspecialty areas.[3] This category includes cooperative education, in which students earn school credit for work experience related to a specific occupational program.

- ***General Labor Market Preparation (GLMP):*** Provides general employment skills that are not specific to any particular occupational area, such as courses in typing or keyboarding, introductory technology education, career education, and general work experience.

[3]The National Association of State Directors of Career and Technical Education is currently leading an effort to reorganize occupational groupings into 16 broad career clusters. However, a "crosswalk" between that recategorization and national course lists for coding transcripts was not available.

Figure 2.1

Vocational-Technical Course Taxonomy

Vocational-technical

- Family and Consumer Sciences Education
- General Labor Market Preparation
- Specific Labor Market Preparation (Occupational Education)

Agriculture (and Renewable Resources)

Agricultural mechanics
Agricultural production
Agricultural occupations
Horticulture
Livestock
Animal sciences
Landscaping
Forestry
Environmental management

BUSINESS

Business Services

Bookkeeping
Accounting
Recordkeeping
Office machines
Secretarial
Office procedures
Word processing
Business data processing
Business computer programming
Data entry operator

Business Management

Business management careers
Financial careers
Business administration
Business management
Banking and finance
Business economics

Marketing

Distributive education
Marketing and distribution
Insurance careers
Real estate marketing
Fashion merchandising
Entrepreneurship
Other marketing

Health Care

Health occupations
Health technology/laboratory
Nursing assisting
Dental assisting
Dental technology

Protective Services (and Public Services)

Criminal justice
Fire fighting
Human services

TECHNOLOGY

Computer Technology

Computer appreciation
Computer mathematics
Computer applications
Computer programming
Data processing
Computer and information sciences

Communications Technology

Yearbook production
Broadcast management
Film making and production
Telecommunications
Radio/television production
Videotape production
Other communications
Other communications technologies

Other Technology

Electronic technology
Electromechanical technology
Industrial production technology
Chemical technology
Engineering technologies

TRADE AND INDUSTRY

Construction

Electricity
Bricklaying and masonry
Carpentry
Building construction
General construction trades
Building maintenance
Plumbing
Housewiring

Mechanics and Repair

Industrial mechanics
Radio and TV repair
Air conditioning, refrigeration, and heating
Power mechanics
Small engine repair
Auto mechanics
Auto body/service
Aviation powerplant

PRECISION PRODUCTION

Print Production

Computer-assisted design
Drafting
Architectural drawing
Commercial art
Graphic arts
Sign painting
Graphic and printing communications

Materials Production

Machine shop
Metal
Welding
Foundry
Plastics
Woodworking
Cabinetmaking

Other Precision Production

Electronics
Leatherwork and upholstery
Meatcutting
Commercial photography

Transportation

Aeronautics
Aviation technology
Aircraft parts management
Marine mechanics
Transportation technology
Vehicle and equipment operation

Food Service and Hospitality

Food services
Culinary arts
Hospitality sales
Hotel and motel management

Child Care and Education

Child care services
Child development
Other education
Library science

Personal and Other Services

Interior design
Cosmetology/barbering
Dry cleaning
Building and grounds maintenance
Custodial and housekeeping services
Clothing and textiles
Home economics occupations
General services occupations

SOURCE: Adapted from Bradby and Hoachlander (1999).

- ***Family and Consumer Sciences Education (FCSE):*** Intended to prepare students for family and consumer roles outside the paid labor market, including consumer and home economics.

These courses can be expected to attract different types of students across various grade levels.

The sequence and organization of vocational courses vary for each student.

Vocational education is an option for high school students. With input from parents, students choose to enroll in a vocational high school or area vocational school, if one is available; at comprehensive high schools, they choose to take vocational courses in place of study hall or other elective offerings, such as art, music, or more advanced academic courses. The elective nature of vocational education has important implications for policy because efforts to improve the rigor or structure of vocational education will likely affect how many and which students participate.

Students can also choose to, and do, take vocational courses in varying numbers and with different objectives in mind. Many schools offer sequences ("programs") of related, increasingly advanced courses in one or several specific occupational areas (e.g., health, drafting, child care). However, actual course taking does not necessarily follow these organized offerings. Most vocational courses and programs have no prerequisites, with students being free to enroll in courses across occupational areas and levels, although some choose to focus on a single occupation (Boesel et al. 1994b, pp. 85–87). The exceptions are specialty career preparation programs like career academies and youth apprenticeships, in which students' decisions to enroll are at least tentative commitments to follow the programs' defined sequences of vocational and academic courses.

Because involvement in vocational education varies, it is difficult to identify a group for evaluation purposes whose participation and outcomes would be best to measure.[4] There are several possibilities:

- ***Vocational Course Taker:*** Graduate earning any credits in any form of vocational education

    - ***Occupational Investor:*** Graduate earning three or more credits in occupational courses, regardless of how these credits are organized; made up of two subgroups (concentrators and explorers).

[4]Historically, students could be clearly distinguished by the "track" or set of courses in which they participated—college preparatory, vocational, and general. However, these labels and the patterns of course participation they represent are no longer clear cut.

- ***Occupational Concentrator:*** Graduate earning three or more occupational credits but in a single program area (e.g., health care or business services).

- ***Occupational Explorer:*** Graduate earning three or more occupational credits but in more than one program area (e.g., business services and agriculture).

Previous research has focused on "occupational concentrators"—students who take three or more credits (corresponding to approximately three, year-long, single-period courses) within a single occupational program area. This group of students has received attention because they are the closest proxy to program completers and are thought to be most intent on preparing for a job or career.

From a policy perspective, however, concentrators are not the only group of interest. The larger population of all students (44.5 percent) who earn three or more occupational credits, of which concentrators are a subset, is also important. Perkins grants are distributed to institutions—districts and schools—to fund courses and programs not individual students. Therefore the federal investment is similar whether students concentrate their vocational course taking in a single occupational program area (26.0 percent) or "explore" across several areas (18.5 percent). Together, concentrators and explorers account for the vast majority of credits earned in vocational or occupational education. Each of these groups was examined in NAVE analyses.

B. Access and Participation

For the last several decades, virtually every student has left high school having completed at least one vocational course and some have taken many. Some aspects of vocational participation are changing, however. School reforms, evolving social and economic conditions, and other factors are helping to shape the availability of and interest in vocational education programs. Patterns of participation provide some indication of the vitality of vocational education at the secondary level and the extent to which these courses and programs serve populations of policy interest.

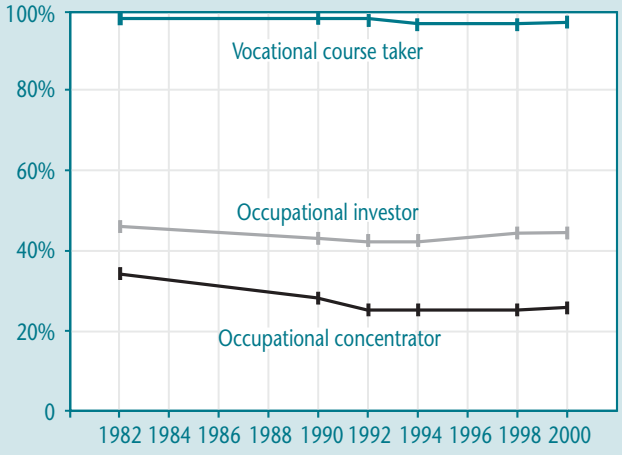
1. Overall Trends in Vocational Education Enrollments

Enrollment trends reflect both continuing interest in vocational education and its changing role. How much, and how, students participate over time is one signal of the future direction of career preparation in high schools.

There is little evidence of an ongoing drop in students' participation in vocational education.

A common concern in the vocational education community has been that increasing college aspirations and emphasis on academic improvement might reduce students' participation in vocational education (Levesque et al. 2000). However, at least through 2000, students' involvement has not decreased as dramatically as predicted. The most commonly used measure of participation indicates that the decade of decline through the 1980s appears to have leveled off; the share of occupational concentrators fell substantially between 1982 and 1992 but has been fairly steady since then, at about one-quarter of all high school graduates (Figure 2.2). That figure translates into more than 725,000 students nationally who have pursued what might be called a "vocational program of study."[5]

Figure 2.2
Percentage of Students Participating in Vocational Education: 1982–2000



SOURCE: Levesque 2003b, 2003c. Analysis of National High School Transcripts.

Perhaps more importantly, researchers have typically ignored the larger share of students who take at least 3.0 occupational credits ("occupational investors"), of which occupational concentrators are only a subset. Examining the trends in this broader measure suggests that, in fact, there has been little change over the past 15 years. Between 42.0 and 46.2 percent of all high school graduates since 1982 have invested in vocational education in this way, or more than 1.2 million seniors in 2000 (see footnote 5). In part, this level of participation in occupational courses has been maintained because increasing numbers of students are taking at least one computer technology course, at the same time that enrollments in some other occupational program areas have declined.

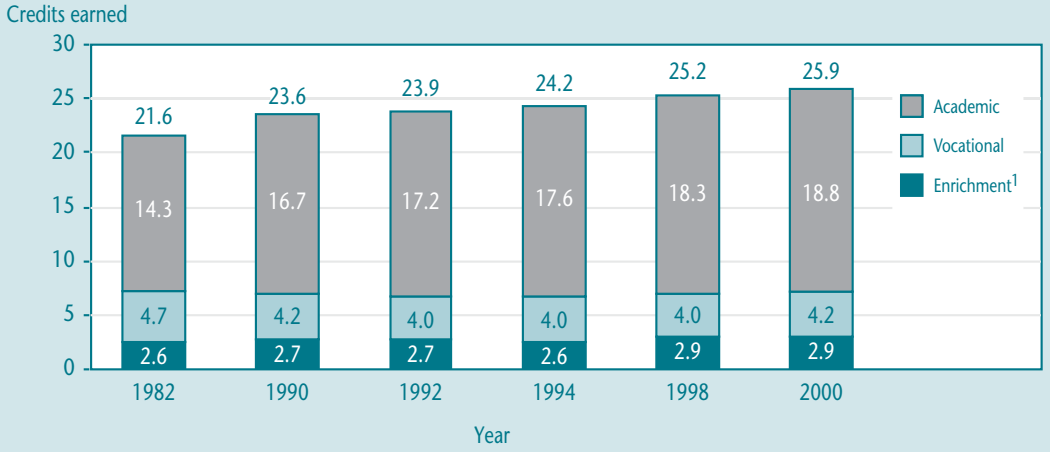
[5]According to the 2002 *Digest of Education Statistics* (http://nces.ed.gov/programs/digest/d02/tables/dt038.asp, Table 38), there were 2,799,484 12th-grade students in 2000. If we assume all of those students graduated that year, the 26.0 percent who were occupational concentrators amount to 727,899 students. These students are included in the 44.5 percent of graduates who were occupational investors, with the larger group amounting to 1,245,770 students.

Secondary vocational education is a large component of high school course taking but an increasingly smaller share of the overall curriculum.

Despite relatively stable student participation rates over the last decade, however, vocational education is becoming a smaller share of the way students spend their time in high school (Figure 2.3). The number of average credits earned in vocational education fell from 4.7 in 1982 to 4.2 in 1990 (mostly the result of fewer keyboarding or typing classes in high school) and remained steady at between 4.0 and 4.2 through 2000.[6] At the same time, academic credits increased substantially—from 14.3 to 18.8, making total credits rise. As a result, vocational education's share of total credits dropped from 21.8 percent in 1982 to 17.9 percent in 1990 and to 16.2 percent in 2000.

Figure 2.3

Average Credits Earned by High Schools Students, by Type of Course Work: 1982–2000



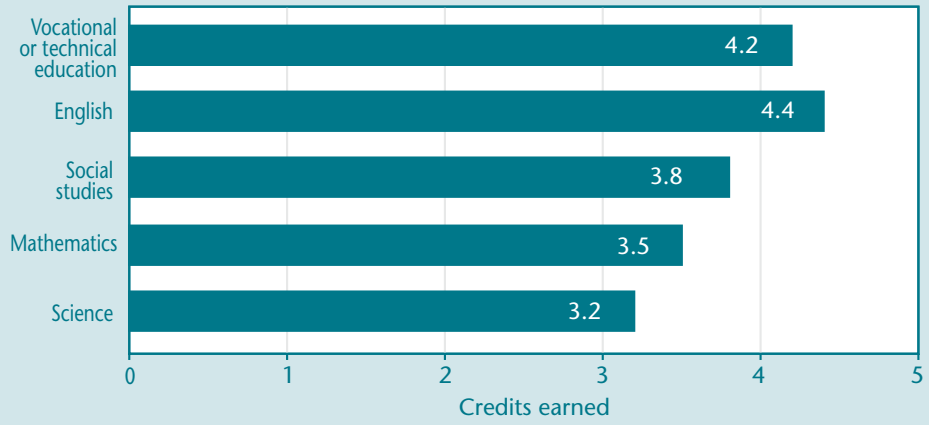
SOURCE: Levesque 2003b, 2003c. Analysis of National High School Transcripts.

[1]Includes courses such as art, music, and driver's education.

Despite the overall declining share of vocational education credits, high school students still earn more credits in vocational education (4.2) than in math (3.5), science (3.2), or social studies (3.8) (Figure 2.4). Moreover, in 2000, the 4.4 English credits students earned on average are not statistically different from the credits they earned in vocational education. These findings are particularly striking, given the emphasis that has been placed on academic reforms and higher graduation requirements during the last two decades.

[6]Between 1982 and 2000, General Labor Market Preparation courses declined from 1.0 credits to 0.7 credits at the high school level (Levesque 2003c). In particular, fewer students are taking keyboarding or typing courses in high school, perhaps because these courses are now offered in middle school. In contrast, average credits earned in occupational education—courses such as health, business, trade, and industry—have been relatively constant since 1982.

Figure 2.4
Average Credits Earned by High School Students, by Subject Area: 2000



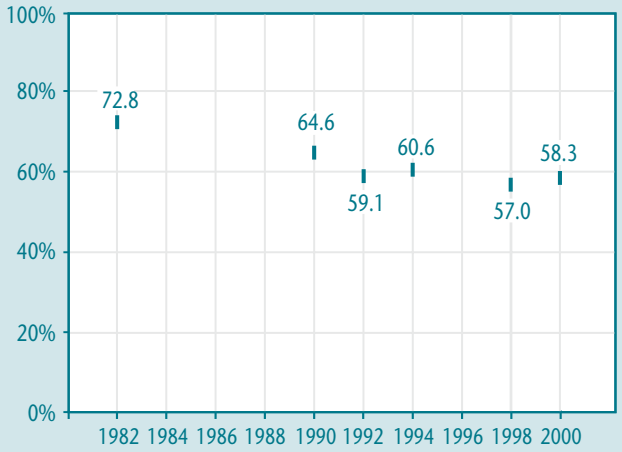
SOURCE: Levesque 2003b, 2003c. Analysis of National High School Transcripts.

Students may now be taking vocational education for different reasons.

Historically, students enrolled in vocational education to prepare for entry-level jobs after high school. Meeting this objective called for developing skills in a particular occupational area and likely encouraged students to "concentrate" their course taking as a way to maximize their appeal to potential employers. Federal law, particularly in Perkins II and III, supported this goal by promoting school implementation of, and student participation in, "sequences" of related vocational courses.

Despite these efforts, however, the clear trend in vocational course taking has been toward "exploring" across occupational program areas rather than "concentrating" (Figure 2.5). Among students who earn at least 3.0 occupational credits (investors), concentrating was a less common way to

Figure 2.5
Percentage of Occupational Investors Who "Concentrate" Their Occupational Courses in a Single Program Area: 1982–2000



SOURCE: Levesque 2003b, 2003c. Analysis of National High School Transcripts.

organize course work in 2000 (58.3 percent) than it was in 1982 (72.8 percent), when a higher proportion of students were taking three or more credits in multiple program areas. Similarly, students were much less likely to take advanced course work in their area of concentration than in 1982 (Levesque 2003b).

These data suggest that fewer students may now view developing skills in a specific program area as their main objective for enrolling in vocational education. Focus group discussions with students in vocational courses suggest a variety of other reasons for their participation: to gain career exposure, to help them select or prepare for a college major, to use as a fall-back if college or other career plans fail to materialize, to pursue a leisure interest, or to take courses that present less of an intellectual challenge than do other courses (Table 2.2).

There are also several possible, alternative explanations for the change in vocational course-taking patterns. First, there is some evidence that schools may be increasingly less likely to *offer* full sequences of related courses, perhaps choosing to trade depth in the programs they offer for giving students more breadth across program areas (Branch forthcoming). It is also possible, however, that recent vocational course taking reflects broader conceptions of career preparation. Students may be organizing what appears to them and to their counselors to be a logical sequence of occupational courses representing different program areas as classified by NCES. For example, a student who wants to run a landscaping firm might appropriately enroll in both agriculture and business courses, while a student interested in pediatric nursing could view both child care and health care skills as important preparation for later college courses.

As of yet, the full effects of school improvement policies on vocational participation have not been felt, but future declines are possible.

Most of the decline in vocational course taking occurred between 1982 and 1990, before many would consider the policies associated with academic reforms fully implemented. During the decade of reform since then, vocational participation in the aggregate remained relatively stable, suggesting that these efforts have not had much of an effect on vocational enrollments. Looking beyond tabulations of the aggregate participation measures tells a slightly different story, however, which foreshadows possible declines in future vocational education course taking.

- ***Course graduation requirements increased only slightly during the 1990s and not across the board.*** While the 1990s often have been referred to as the "decade of school reform," certain reform policies that might be expected to affect vocational participation were not as evident during this period. Between 1980 and 1990, approximately 39 states increased their total course graduation requirements, and participation in vocational education did decline substantially during that time.

Table 2.2
Student Perspectives on Reasons for Participating in Vocational Education

Reason	Illustrative Quotations
Help select or prepare for a college major	*I took a variety of courses because I didn't know what I wanted to do in college.*
	I think it's a head start. You know that you liked it in high school, so when you get to college you'll have a better idea what to take.
	I took mine to prepare for college. You're better off in college if you've taken these courses. I took accounting, business management and a few others.
	I plan on majoring in agricultural for a career. [These courses] will give me a better background for college courses.
Fallback strategy	*I want to become a lawyer. I'm taking auto tech to have something to fall back on.*
	My mom said that I should take it because you don't know what's going to happen.
	I also want to be a singer and it (cosmetology) makes a good back-up plan.
Enrich everyday life	*I want to know how to do a bit of everything.*
	Fixing cars is something I like to do, something I can do. Also, I save money fixing cars myself.
	Accounting is something that you can use every day. You can help prepare taxes for yourself and others.
	Computer classes help with school work, to be able to type school papers.
Balance the pressure of academic course work	*…something different from regular school work.*
	You don't do the same thing every day. It's not all book work.
	It is an alternative to the regular "just go to class"…Hands-on. I took them because I figured they'd be easy. I needed a break.
	I took building maintenance because it was an easy "A."
	I chose voc. ed. because I didn't want to take Spanish and physics.
Immediate job preparation	*I can get a license in July. I picked voc. ed. to get experience while I'm young so I can get a job at an early age.*
	Yeah, foods. My sister and I are going to start this catering business.
	I took up the trade of welding so that I could find a job right out of high school.

SOURCE: Branch forthcoming.

However, only 12 states increased their graduation requirements between 1990 and 1998 (Education Commission of the States 1990; Snyder et al. 2001).

Moreover, the six states that increased their requirements by 2.0 credits or more between 1990 and 1998 exhibited (1) a significant decrease of 1.0 vocational credits earned by high school students and (2) a decline of 9.6 percent in the proportion of occupational concentrators, both statistically significant results (Table 2.3). Many factors could account for this decline in vocational participation in these states, but the significant increase in graduation requirements is certainly a strong hypothesis. Further efforts to raise graduation requirements may well reduce participation in vocational education.

Table 2.3
Changes in Vocational Education Participation Measures, by Change in State Graduation Requirements: 1990 to 1998

Change in Total Graduation Requirements	Number of States	Average Vocational Credits Earned			Percentage of Graduates Who Are Concentrators		
		1990	1998	Change	1990	1998	Change
Increase of 2.0 or more credits	6	4.1	3.1	-1.0*	30.3	20.6	-9.6*
Increase of less than 2.0 credits	6	4.5	4.1	-0.4	33.8	28.7	-5.1
No increase	32	4.0	4.1	0.1	24.2	24.0	-0.2
Not applicable[1]	6	4.6	4.2	-0.4	29.5	29.6	0.1

SOURCE: Levesque 2003c. Analysis of National High School Transcripts.

[1]States that allowed local school districts to set high school graduation requirements in one or both years.

*Statistically significant at the 1.96 critical level for comparison between 1990 and 1998.

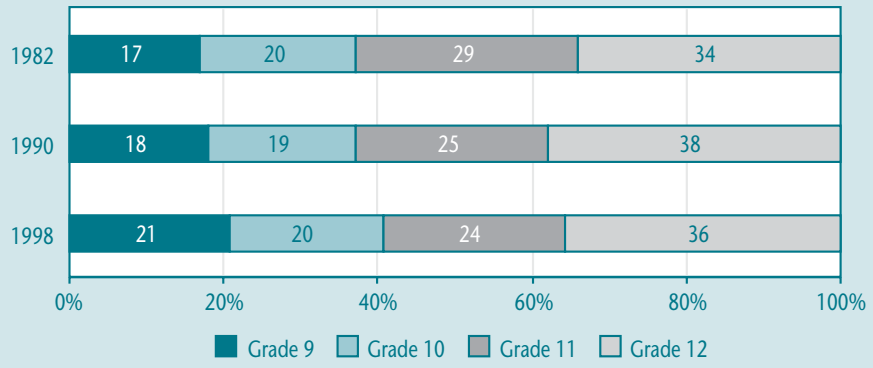
- ***Students mostly maintained their participation in vocational education by expanding the total number of credits earned.*** Nationally since 1990, high school students greatly increased their academic course taking, while vocational credits remained relatively steady. If the increase in academic credits reflects schools' emphasis on academic improvement, vocational course taking might have fallen further, if not for the fact that students could make room for additional academic courses by increasing their total credits earned. However, such expansion may have reached its limits by 2000; students on average earned a total of 25.9 credits, out of a likely 28 possible credits in a traditional school schedule (Figure 2.3).[7] On the other

[7]The maximum of 28 credits was calculated based on the assumption that most high schools offer seven periods of courses each day (1 credit for each year-long course) over four years, for a total of 28 credits. New "block-scheduling" approaches can increase the total possible number of credits earned to 32.

hand, alternative "block-scheduling" approaches may allow students to increase their total credits further.

- ***Shifts in vocational course taking do not yet reflect an emphasis on preparation for academic assessments.*** A major reform policy that could have a direct effect on vocational participation is the introduction of state assessments for graduation. By the 1998–1999 school year, nearly 20 states had introduced exit exams required for high school graduation, typically offered first at the end of 10th grade so that students who fail have several opportunities to retake the tests (Council of Chief State School Officers 2000). One hypothesis was that schools would increasingly focus students in the early high school grades on academic courses and preparation for the assessments, potentially crowding out vocational courses until later in the high school years. Such a shift was not evident between 1990 and 1998, however. During that period, vocational credits earned in 11th grade declined somewhat. As a result, students were taking a similar, or slightly higher, share of their vocational credits before the typical 10th-grade state assessment (Figure 2.6).

Figure 2.6
Percentage Distribution of All Vocational Credits Earned, by Grade Level: 1982, 1990, and 1998



SOURCE: Levesque 2003c. Analysis of National High School Transcripts.
NOTE: Percentages may not add to 100 due to rounding.

These patterns may reflect the fact that, at the end of the decade, relatively few states had yet phased in the consequences for students who passed or failed to pass statewide assessments. The aggregate decline in 11th-grade vocational participation is more likely due to increased graduation requirements in those 12 states that raised them, leading to more academic rather than vocational course taking in grade 11.[8] However, under the No Child

[8]Most states, for example, increased the years of math or science (or both) required from two to three, which would most likely affect 11th-grade course taking (Education Commission of the States 1990; Snyder et al. 2001).

Left Behind Act of 2001, all states must assess students' academic skills at least once during high school and states must first identify, and then ultimately may sanction, schools receiving federal funds that fail to improve aggregate test scores over time. As assessments become more fully implemented, and if states maintain their high standards for passing, the hypothetical decline in vocational participation is much more likely.

2. Participation by Type of Vocational Course Work

Examining vocational education by type of course is important for several reasons. First, different categories of vocational education may yield different benefits for students. For example, there is a presumption about the quality of vocational programs in various fields: program areas that prepare students for jobs that require high skills and pay high wages are generally considered more beneficial than those that prepare students for jobs with fewer skill demands and lower pay. In addition, policymakers have long been concerned that students who invest in vocational education be able to find jobs. Therefore, some match between vocational program offerings and labor market needs is desirable.[9]

Changes in participation by occupational program are consistent with labor market trends.

Policymakers have long called for stronger linkages between employers and vocational educators, in part to ensure that the availability and quality of vocational programs reflect employer needs.[10] Perkins III, for example, authorizes funding for national and state-level entities to coordinate and disseminate occupational and employment information. However, labor market demand may do more than influence administrative judgments about program offerings: students may be more likely to take courses or concentrate in vocational program areas that prepare them for occupations with increasing job opportunities.

A recent NCES analysis (Hurst and Hudson 2000) supports the hypothesis that vocational course taking may respond somewhat to labor market demand (Figures 2.7a and 2.7b). A substantial portion of the change occurring in the proportion of concentrators in specific occupational program areas between 1982 and 1998 appears to coincide with projected job growth from 1983 to 1996:[11]

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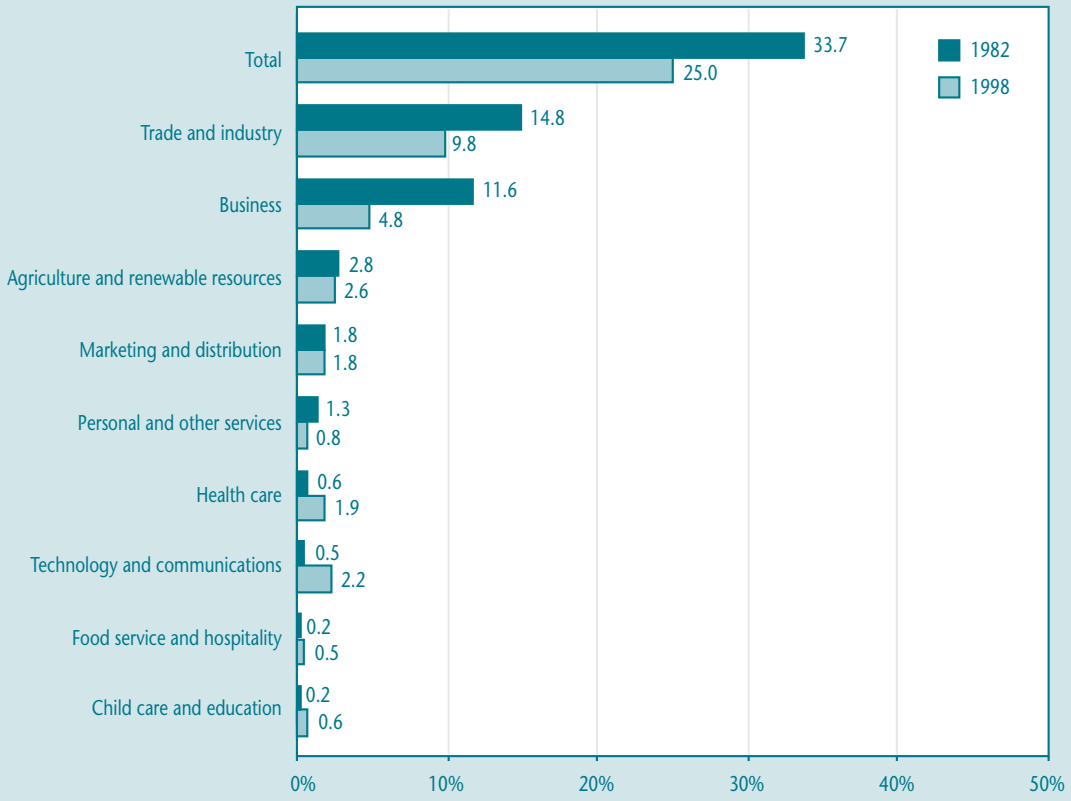
[9]The data on which national course-taking trends are based, transcripts collected as part of the National Assessment of Educational Progress (NAEP), cannot adequately assess quality, so some judgment about program areas is necessary.

[10]Perkins III requires that state plans describe how "vocational and technical education relates to state and regional occupational opportunities" (Sec. 122(c)(15)) but does not require states or local programs to focus their activities on preparing students for occupations for which there is current or projected unmet demand in the labor market.

[11]It is unclear whether the consistency in course taking and job growth reflects changes in school program offerings, changes in student preferences, or both.

Figure 2.7a
Percentage of Students Concentrating[1] in Various Occupational Programs: 1982 and 1998



SOURCE: Hurst and Hudson 2000. Based on analysis of High School and Beyond (1982) and National Assessment of Educational Progress (1998) Transcripts.
[1]Taking three or more occupational courses in a single program area.

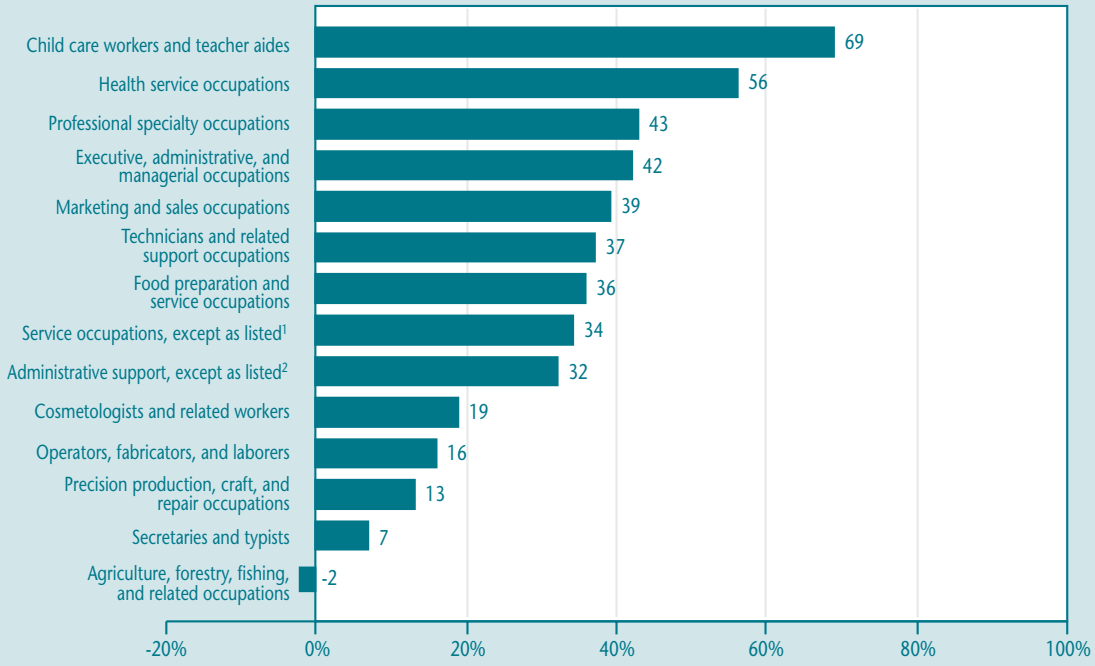
- ***Increases in enrollment and job growth in four key areas.*** Four programs experienced the largest gains in the proportion of concentrators: health care, child care and education, food service and hospitality, and technology and communication.[12] During the same period, the corresponding job categories—health service occupations, child care workers and teacher aides, food preparation and service occupations, and technicians and related support occupations—had higher than average employment growth.

- ***Decreases in trade and industry and business.*** The largest declines in occupational concentrators were in the trade and industry and business program areas; these areas

[12]Although enrollments in these program areas grew significantly in relative terms, the absolute number of students participating in these programs is still small.

Figure 2.7b

Percentage Change from 1983 to 1996 in Number of Jobs, by Occupational Grouping



SOURCE: Hurst and Hudson 2000. Based on U.S. Department of Labor, Bureau of Labor Statistics, National Industry-Occupational Employment Matrix 1983–1996 Time Series.

[1] Excludes health service occupations; homemaker-home health aides; child care workers; food preparation and service occupations; and cosmetologists and related occupations.

[2] Excludes secretaries, typists, and teacher aides.

approximately correspond to occupations that had experienced below average projected growth rates since the early 1980s.

While some responsiveness to employment trends is desirable, it is worth noting that a substantial share of the recent growth in vocational participation and jobs has been in low-wage sectors. There can be great variation in wages and earnings within each occupational grouping, particularly in the technology and communications fields. However, recent data indicate that in 2000, average annual earnings were $21,040 for health care support workers, $16,070 for food preparation and service workers, $18,770 for teacher assistants, and $16,350 for child care workers (Bureau of Labor Statistics 2001). These occupations are certainly important to society, but the data provide little evidence that vocational education is concentrating on preparing individuals for jobs that require high skill levels and pay high wages as promoted in Perkins III (Section 122(c)(1)(c)).

Participation in cooperative education and other work experience programs remains steady.

Opportunities for students to obtain work experience as part of their vocational training have existed since the early 20th century. Many years later, throughout the 1990s, just under one-third of all high school graduates enrolled in work experience courses for credit (Table 2.4). Both the rates of student participation and the average credits earned in these courses remained stable during the decade. Participation was divided relatively evenly between general work experience activities, which are typically unconnected to a student's occupational program, and more formal cooperative education (co-op) experiences in which students are generally expected to alternate work placement and class time related to their occupational course work.[13] These figures suggest that approximately 435,000 high school graduates participated in co-op experiences, a number consistent with that reported in the previous NAVE (Boesel et al. 1994b).

Table 2.4
Percentage of High School Graduates Earning Credits in Work Experience Courses, by Type of Course: Selected Years 1990–1998

Type of Course	1990	1992	1994	1998
Any work experience course	28.3	26.8	25.9	31.6
Cooperative education	13.8	12.2	15.2	16.3
General work experience	17.6	16.8	13.3	18.9

SOURCE: Levesque 2003b. Analysis of High School Transcripts.

NOTE: Observed changes across years are not statistically significant.

3. Characteristics of Participants: Special Populations and Other Students

Who participates in vocational education has been a continuing policy concern. While federal legislation in the 1960s and 1970s aimed to improve access to vocational education for certain special populations, the current debate is whether vulnerable groups are overrepresented in and well-served by vocational education. Some previous reports suggested that, by the early 1990s, vocational education had come to be stigmatized as a

[13]Co-op is offered mostly in the vocational areas of marketing, trade and industry, and business. Although more than 16 percent of 1998 graduates earned co-op credits, only about half of these—9.3 percent of all graduates—were clearly in co-op related to a specific occupational program (Levesque 2003b).

high school track for students with low levels of academic achievement, special needs, or behavioral problems (Boesel et al. 1994b).

During the last decade, however, career education has been given new prominence by several initiatives targeted to students other than those traditionally served by vocational programs. In addition, some states and districts have worked to strengthen the appeal of vocational courses—for example, moving away from training for what used to be considered blue-collar jobs, such as manufacturing, secretarial work, and child care, toward programs in pre-engineering, information technology, and education.

Policymakers and educators remain committed to providing students from special populations access to vocational education. However, many believe that the quality of vocational programs is unlikely to improve without attracting a broader segment of the student population or that the participation of a more diverse set of students will signal that quality improvements are being made.

For these reasons, it is important to examine the characteristics of students involved in vocational education. While a variety of characteristics were analyzed for the purposes of this report, particular attention was paid to those that define the special population groups named in Perkins III (P.L. 105-332, Section 3(23)) and that can be identified in available data (Table 2.5).[14] The participation of two other groups defined in the law—

Table 2.5
Measures Used to Define Special Population Groups

Special Population Group	Measure Used
Individuals with disabilities	Students with Individual Education Plans
Individuals from economically disadvantaged families	Students in schools in which 50 percent or more students are eligible for the National School Lunch Program
Individuals preparing for nontraditional training and employment	Students in occupational programs that are nontraditional for their gender
Individuals with other barriers to educational achievement, including individuals with limited English proficiency	Students who (1) take low-level math in 9th grade (proxy for achievement) or (2) are limited English proficient

[14]Unfortunately, the NAEP transcripts do not contain many indicators of student characteristics; some measures were constructed based on the characteristics of the students' schools.

single parents and displaced homemakers—could not be addressed with the current data and are probably more important to examine at the postsecondary level.

Vocational education continues to serve a somewhat disproportionate share of students with disabilities and does so in the more traditional program areas.

In 1998, students with disabilities represented 2.8 percent of all high school graduates, but 4.2 percent of all occupational concentrators (Levesque 2003a). As in previous years, these students were much more likely to become concentrators (37.5 percent) and to earn substantially more credits in vocational education (5.9 credits) than did students without disabilities (24.6 percent and 3.9 credits) (Table 2.6). In fact, students with disabilities took a much higher share of their total credits in vocational education (23.5 percent) than did other students (15.7 percent) (Levesque 2003a). This course taking emphasis may shift as the No Child Left Behind Act becomes fully implemented and states are required to more consistently include special needs students in academic assessment reporting.

There is little recent support, however, for a prediction made in a report produced under the previous NAVE (Boesel et al. 1994a) that students with disabilities are becoming more concentrated in vocational education. Although data between 1982 and 1990 show a modest trend in that direction, it is not sustained during the 1990s. In addition, with special needs students accounting for less than 5 percent of all concentrators nationally, the notion of vocational education in general as a "dumping ground" for these students is not warranted.[15] Moreover, although students with disabilities are overrepresented in some of the more traditional vocational program areas—e.g., agriculture, construction, mechanics and repair, and materials production (Table 2.7)—some of these areas prepare students for occupations with substantial job growth, earnings, or both. For example, automotive mechanics, electricians, and welders all had earnings in 2000 above the median and are projected to experience above average employment growth as well (Bureau of Labor Statistics 2001).

Participation in vocational education is highest in low-income schools.

Despite reform efforts during the 1990s that targeted low-income schools for academic improvement, students in these schools were taking more vocational education than students in the most advantaged schools. In 1998, students in schools with more than 50.0 percent of students eligible for the federal free or reduced-price lunch program earned 4.7 vocational credits, while students in schools with 5.0 percent or less eligible

[15]Area and regional vocational schools, in particular, report serving disproportionate numbers of students with disabilities, but trends in these schools' participation cannot be separated from those of other schools serving students in vocational education.

Table 2.6

Participation Measures, by Student Characteristics: 1990 to 1998

Student Characteristics	Average Number of Vocational Credits Earned			Percentage of Students Who Are Occupational Concentrators		
	1990	1998	Change	1990	1998	Change
All students	4.2	4.0	-0.2	27.8	25.0	-2.8*
Gender						
Male	4.3	4.3	+0.0	32.3	30.7	-1.6
Female	4.1	3.8	-0.3*	23.6	19.9	-3.6*
Race or ethnicity						
Native or American Indian	4.6	4.0	-0.6*	38.0	25.5	-12.5*
Asian or Pacific Islander	3.1	3.2	+0.1	16.6	16.8	+0.2
African American	4.4	4.3	-0.1	27.3	27.2	-0.1
Hispanic	4.1	4.0	-0.1	27.9	22.9	-5.0
White	4.2	4.0	-0.2	28.5	25.3	-3.2*
Disability status						
Has disability	6.0	5.9	+0.1	42.2	37.5	-4.7
None indicated	4.1	3.9	+0.2	27.4	24.6	-2.8*
English proficiency						
Limited (LEP)	2.9	3.2	+0.3	12.4	8.7	-3.7
Proficient	4.2	4.0	-0.2	27.8	25.1	-2.7*
Grade 9 mathematics						
Geometry or higher	2.7	3.0	+0.3	12.0	17.5	+5.5*
Pre-algebra or algebra	3.9	4.1	+0.2	25.3	26.2	+0.9
No or low math	5.3	4.8	-0.5**	39.3	29.6	-9.7**
School locale[1]						
Urban	3.7	3.6	-0.1	21.4	23.1	-1.7
Suburban	3.6	3.6	0.0	21.9	21.5	-0.4
Rural	4.8	4.8	0.0	31.3	31.0	-0.3
School income level						
Low	n/a	4.7	n/a	n/a	29.2	n/a
Medium	n/a	4.1	n/a	n/a	26.8	n/a
High	n/a	3.2	n/a	n/a	15.7	n/a

SOURCE: Levesque 2003a. Analysis of National High School Transcripts.

[1]A comparable school locale variable was not available in 1990, so 1992 data were used instead.

n/a = not available or missing data.
LEP = Limited English proficient.

*Statistically significant at the 1.96 critical level for comparison between 1990 and 1998.
**Statistically significant at the 2.58 critical level for comparison between 1990 and 1998.

Table 2.7

Percentage of High School Graduates Who Concentrated in Selected Occupational Programs, by Student Characteristics: 1998

Student Characteristics	Agriculture	Business	Health	Food/ Hosp.	Child Care	Personal Services	Tech.	Trade/ Industry
All students	2.6	4.8	1.9	0.5	0.6	0.8	2.2	9.8
Gender								
Male	3.5	3.2	0.7	0.4	0.1	0.2	2.4	18.5
Female	1.8	6.3	3.0	0.5	1.0	1.4	2.2	1.7
Race or ethnicity								
Native or American Indian	2.5	3.6	—	—	—	—	2.3	13.6
Asian or Pacific Islander	0.8	3.7	2.1	0.3	0.1	—	2.1	6.7
African American	0.8	7.0	4.7	1.4	0.6	1.3	1.7	7.2
Hispanic	1.5	4.3	2.1	0.2	0.5	1.3	1.8	9.1
White	3.2	4.6	1.3	0.3	0.6	0.7	2.4	10.6
Disability status								
Has disability	6.9	4.0	1.4	0.8	0.7	2.4	1.5	18.7
None indicated	2.4	4.9	1.9	0.5	0.6	0.8	2.3	9.5
English proficiency								
Limited (LEP)	—	2.2	—	—	—	—	—	5.2
Proficient	2.6	4.9	1.9	0.5	0.6	0.8	2.3	9.8
Grade 9 mathematics								
Geometry or higher	1.2	3.4	3.3	0.2	0.3	0.2	3.1	4.6
Pre-algebra or algebra	2.9	5.4	1.6	0.5	0.7	0.9	2.1	10.2
No or low math	2.8	4.6	1.3	0.8	0.6	1.2	1.9	14.4
School locale								
Urban	0.4	4.7	3.4	0.7	0.8	1.1	1.5	8.0
Suburban	1.2	3.7	1.1	0.5	0.6	0.8	2.5	8.9
Rural	6.1	6.4	1.4	0.3	0.4	0.6	2.5	12.5
School income level								
Low	1.1	3.2	1.3	0.3	0.6	0.7	1.7	5.7
Medium	2.9	4.8	1.9	0.5	0.6	0.7	2.4	10.8
High	4.0	6.5	3.6	0.1	0.3	1.1	1.9	10.3

SOURCE: Levesque 2003a. Analysis of National High School Transcripts.

— = sample too small to compute mean.
LEP = Limited English proficient.

for this program earned only 3.2 credits. Students in "moderate-income" schools earned 4.1 vocational credits, an amount that is statistically similar to that for students in the lowest-income schools. The proportion of students who concentrate in an occupational program also follows this pattern. Changes in either the average vocational credits earned or the percentage of concentrators between 1994 and 1998—the only years for which comparable data on school poverty are available—are not statistically significant.

While students in low-income schools are involved in vocational education at high rates, their participation does not appear to be concentrated in the traditional vocational program areas or in those that prepare students for generally low-wage jobs. That is, economically disadvantaged students are no more likely than more advantaged students to concentrate in construction, materials production, mechanics and repair, personal and other services, or food service and hospitality. Moreover, disadvantaged students are *as likely*, if not slightly more likely, to concentrate in the growing fields of health care and computer technology.

Some progress has been made, although substantial disparities remain, in students' participation in vocational education by gender.

Overall the vocational course taking of females has declined since 1990, while their academic course taking has risen substantially. In 1998, females earned a lower share of their total credits in vocational education (14.9 percent) than did males (17.1 percent). This difference in course taking is consistent with the higher levels of reading achievement and rates of college attendance for young women, compared to young men in 1998 (Wirt et al. 2000, p. 23 [Indicator 13] and p. 49 [Indicator 32]).

On average, high school preparation for occupations and careers has become neither more nor less gender balanced, despite the goals of Perkins gender equity provisions. Females still dominate enrollments in programs that prepare students for occupations such as health care, child care and education, and personal and other services (e.g., cosmetology). Males continue to dominate participation in agriculture and the traditional trade and industry programs (e.g., construction, mechanics and repair, print and materials production), fields that generally command higher wages than those for which female high school students prepare. However, there are two notable program areas in which the gap in participation rates between males and females appears to have narrowed:

- ***Computer technology:*** The gender difference in credits earned in computer technology has become smaller. In 1998, females earned .30 credits, while males earned .32 credits, a statistically insignificant gap of 6.7 percent, down from 17.9 percent in 1990. This narrowing of the gap was accomplished largely by an increase in the rates of participation in this vocational field among females, while those of their male peers remained relatively steady.

Despite this progress, there is evidence that females' rates of participation in computer technology courses are not evenly distributed. A case study of popular new information technology (IT) certification courses organized by such firms as Cisco, Microsoft, and Novell, and implemented in high schools and vocational schools nationwide, suggests that females are underrepresented in these courses. Among the 10 schools with IT programs included in the study, females made up only 10 percent of the participants. A potential explanation for the low participation rates of females is that these particular IT courses are geared toward networking, a subfield of computers that has traditionally attracted more males (Haimson and Van Noy forthcoming).

- ***Business services:*** A reverse trend has occurred in business services. Females have become increasingly less likely, while males have become more likely, to concentrate in this program area. One hypothesis is that interest in secretarial training has declined, while computer-related business courses (e.g., spreadsheets, business data processing), which might have more appeal to males, have become increasingly available.

Students in rural schools are more likely to be involved in vocational education than are students in other locales.

As historically has been the case, vocational education is more prevalent in small, generally rural communities than in other locales. Although rural schools serve 32.3 percent of all public high school graduates across the nation, these same schools serve 40.1 percent of all occupational concentrators. In contrast, urban and suburban schools account for 26.2 and 33.8 percent of concentrators, respectively (compared to 28.4 percent and 39.3 percent of all graduates) (Levesque 2003a). The numbers of vocational credits earned remained steady across all types of locales since 1990, but students in rural schools still earned more credits (4.8) in 1998 than did students in urban and suburban schools (each group averaged 3.6 credits) (Table 2.6).

Not surprisingly, given differences in local labor markets, rural students tend to focus their vocational studies in different occupational programs than do urban or suburban students (Table 2.7). A much higher share of rural students concentrate their vocational course taking in agriculture and, to a lesser extent, in construction and business than do students who live in other locales. On the other hand, rural students are less likely to concentrate in marketing, food service and hospitality, and personal and other services—all occupations with relatively low annual earnings. Rural students are also much less likely than urban students to concentrate in the growing field of health care, although they do so at rates similar to those of their suburban peers. In other occupational program areas, there are no statistically significant differences among students who live in urban, suburban, or rural areas in terms of the extent to which they concentrate in these fields.

African American students participate in vocational education somewhat more, and Asian students somewhat less, than students in other racial or ethnic groups.

There is little evidence of any statistically significant change in participation in vocational education by race or ethnicity during the last decade (Table 2.6). However, in 1998 African American students earned more credits in vocational education (4.3 credits) and Asian students earned fewer credits (3.2) than did students from other racial or ethnic groups (4.0 credits each for Hispanic, white, and Native American students). Among all students in 1998, African Americans earned a higher share of their total credits in vocational education (17.4 percent) than did Asians (12.6 percent), and Asian students earned a lower share than did students from all other racial and ethnic groups (Levesque 2003a).

There were also some differences according to race and ethnicity in terms of the specific programs in which students participated during the last decade (Table 2.7). African American students, for example, were more likely to concentrate their vocational studies in health, food service and hospitality, personal services (such as cosmetology) and business services—occupations with projected job growth but below average earnings—and less likely to concentrate in agriculture. Comparatively high proportions of Hispanic students concentrated in agriculture, marketing, personal services, and health. Asian students were most likely to focus their course taking in health programs and much less likely to do so in agriculture or trade and industry programs, including construction.

Students with limited English proficiency (LEP) are much less likely than other students to participate in an occupational program.

The participation of LEP students in vocational education has fluctuated since 1990 (when data on this group first became available), perhaps because the small sample of these students who can be identified in the data makes trend analysis less reliable. However, the data indicate that LEP students in 12th grade earned significantly fewer credits in vocational education (3.2) in 1998 and were much less likely to be occupational concentrators (8.7 percent) than were 12th-grade students with English language proficiency (who earned 4.0 credits and of whom 25.1 percent were concentrators) (Table 2.6).[16]

Vocational education may be attracting more academically talented students than ever before.

During the past two decades, students overall entered high school more prepared to take higher-level math than they had been previously. In large part, this trend is due to the

[16]The small samples of LEP students in national data preclude analysis of their participation by occupational program area. Also, the national data sample is of 12th-grade students, with the classification of LEP based on students' proficiency in their senior year. Students who are LEP in 12th grade are likely to be a small percentage of all high school students who were ever limited English proficient or who were limited proficient at some point in high school.

higher proportion of students taking algebra in middle school—one consequence of the efforts of many states to raise academic standards.

Students who become occupational concentrators are no exception to this trend. Proportionally more concentrators entered high school taking high-level ninth-grade mathematics (geometry or higher) in 1998 than in 1990, an increase similar to that of non-concentrators (Table 2.6). Perhaps more importantly, the increase in middle-level ninth-grade math course taking (pre-algebra and algebra 1) was greater for occupational concentrators than for other students. Conversely, the proportion of occupational concentrators taking low-level mathematics in ninth grade declined more between 1990 and 1998 than did the proportion of other students taking low-level math.

These trends suggest that, over time, vocational education may be serving relatively more academically advantaged students. Certainly, data from a NAVE collaboration with Texas and Florida suggest that the eighth-grade test scores of 1998 concentrators were relatively evenly distributed across quartiles of achievement—indicating that vocational education in those two states is drawing an academically diverse group of students (Hoachlander et al. forthcoming). These patterns are consistent with efforts during the 1990s to broaden the appeal of vocational education, as described in Chapter 1.

Overall, the data indicate that vocational education serves a diverse group of students, with most coming from the middle range of academic and income advantage. As described, some groups of students are more likely to participate substantially, although most characteristics of the vocational student population were relatively stable throughout the 1990s (Table 2.6). These participation patterns may be viewed as reassuring or of concern, depending on whether vocational education improves student outcomes in general and specifically for those who participate at high rates (discussed later in this chapter).

4. Access to Vocational Education

For the past several decades, federal legislation has sought to ensure that students have equal access to vocational education activities. Perkins III does so as well, in part by requiring states to report on the participation and performance of students in the legislated special population groups.[17] Such information cannot tell the whole story, however, because participation, overall and by subgroup, is a function of both students' interest

[17]Perkins III also requires states to include in their state plans, submitted for review to the U.S. Department of Education, Office of Vocational and Adult Education, a description of how individuals who are members of special populations will be provided with equal access to activities under the act (Section 122(c)(8)).

and the courses schools choose to offer. The latter is more important in determining whether students with diverse characteristics and backgrounds can actually participate in vocational education.

With nearly all high school graduates earning at least 1.0 vocational credit, issues of equity are increasingly about access to high-quality vocational education rather than vocational education in general. While there is little research that conclusively identifies the characteristics of vocational program quality, as described in the next section, the Perkins legislation and the vocational education community identify promising strategies and practices considered to promote student success (Table 2.8). The breadth and depth of vocational program offerings in a school is also an important component of access. The availability of some of these efforts for particular groups of students is described below.

Table 2.8
Definitions of Vocational Programs and Strategies Used to Measure Access

Program/Strategy	Definition Used	Data Source
Career academies	Specialized career academy program, in which curriculum that integrates academic and vocational courses is organized around broad career areas.	Schools and Staffing Survey (1999–2000)
Tech-Prep	Specialized program of vocational/technical instruction in the last two years of high school designed to prepare students for two years of postsecondary vocational instruction.	Schools and Staffing Survey (1999–2000)
College credit programs	Opportunities for high school students to earn college credit offered by postsecondary institutions including community colleges, colleges, or distance learning providers. Such arrangements may include dual-enrollment or articulated credit agreements.	Schools and Staffing Survey (1999–2000)
IT certification courses	Occupational programs that prepare students to take and pass vendor-based information technology (IT) certification exams, particularly those offered by Cisco Systems, Microsoft, and Novell.	Information Technology Skill Certification Study: National High School Survey (2001)
Breadth in vocational program offerings	Number and types of occupational programs.	Survey on Vocational Programs in Secondary Schools (1999)

Students in schools with high concentrations of poverty and students from racial or ethnic minority groups have less access to some, but not all, vocational programs and practices presumed to be of high quality.

Congressional concern about access has typically focused on underresourced schools, many of which also serve high numbers of students from racial or ethnic minority groups. Particularly high participation rates among racial or ethnic minority students and those in low-income schools (see earlier section) suggest that their access to vocational education in general is not limited. However, some specialty career preparation programs and strategies are not as available to these students. Compared to schools with poverty levels in the middle range (those with between 5 and 50 percent of students eligible for the federal free and reduced-price lunch program), schools with high concentrations of poverty are less likely to offer Tech-Prep, workplace activities for credit, and college credit for courses completed in high school (Table 2.9). Schools with high proportions of racial or ethnic minorities follow the same pattern.[18]

At the same time, however, schools with high concentrations of poverty and racial or ethnic minorities are as likely as more advantaged schools to offer other popular vocational strategies. For example, access to career academies is similar across schools with different poverty levels. Moreover, a new study of IT certification programs suggests that students from low-income and minority racial or ethnic backgrounds have as much access to these courses and programs as do students from other backgrounds (Haimson and Van Noy forthcoming). Without evidence of the effectiveness of the different programs and practices, it is not possible to draw conclusions about the relative disadvantage that low-income and minority students face in pursuing vocational education.

Compared to urban and suburban schools, those in rural areas offer fewer specialty programs.

Conventional wisdom suggests that because rural schools, and the local labor markets they serve, are smaller, they are less able to offer a diverse set of vocational options.[19] Such a perception is generally true, according to the data. Schools in rural areas are much less likely than those in suburban and urban areas to offer career academies (18.9 percent, compared to 25.7 and 31.9 percent, respectively). IT certification programs are also less available in rural areas: rural schools make up 38 percent of all high schools nation-

[18]High-income schools and those with low proportions of racial or ethnic minorities, some of which require students to pass entry exams or focus exclusively on preparing students for admission to selective colleges, are also less likely to offer many of the specialty vocational programs and strategies.

[19]In 1998–1999, average student enrollment in rural public high schools was 437, compared to 1,120 for schools in urban and suburban areas (Hudson and Shafer 2002).

Table 2.9

Percentage of High Schools Offering Special Vocational Education Programs and Activities, by School Characteristics: 2000

School Characteristics	Percentage of High Schools Offering Program/Activity		
	Career Academies	Tech-Prep	College Credit Programs
All	23.5	47.1	80.0
Income/poverty (percentage of students eligible for free or reduced-price lunches)			
Less than 5%	20.9*	41.1*	79.7*
5–25%	24.2	52.7	88.0
25–50%	24.5	49.4	83.0
More than 50%	23.2	41.0*	64.2*
Minority status (percentage of students from racial/ethnic minorities)			
Less than 5%	18.4*	49.9	86.1
5–50%	23.6	48.3	83.6
More than 50%	29.4*	41.5*	65.2*
Special needs status (percentage of students with disabilities)			
Less than 5%	21.8	27.2*	65.7*
5–10%	25.4	52.3	87.4
11–15%	24.3	52.1	86.6
More than 15%	20.0*	41.6*	66.2*
Urbanicity			
Urban	31.9*	44.1*	73.2*
Suburban	25.7	48.7	83.7
Rural	18.9*	48.7	81.1
Region			
Northeast	20.3	43.6#	80.7
Midwest	20.5	48.2#	85.1
South	28.0#	55.2#	71.7#
West	22.6	35.7#	85.0
School size (number of students enrolled)			
1–150	8.0*	16.9*	57.3*
151–499	20.0	48.5	82.6
500–749	23.6	59.2	88.6
750 or more	36.9*	61.8*	89.8

SOURCE: Levesque 2003d. Analysis of school data from the 1999–2000 Schools and Staffing Survey.

*Statistically significant difference between marked category and middle category or categories.
#Statistically significant difference between marked category and other regional categories.

ally but only 28 percent of the schools that offer IT programs (Haimson and Van Noy forthcoming). Moreover, according to a recent NCES issue brief, rural schools offer fewer different occupational programs (an average of 3.7) than do suburban and urban schools (approximately 4.8 each) and are less likely to make programs available for fast-growing occupations such as computer technicians, graphic designers, nurses, or food service managers (Hudson and Shafer 2002).

Urbanicity is much less a factor, and rural locale less a disadvantage, in a school's likelihood of offering Tech-Prep and course work for college credit (Table 2.9). However, the more limited availability of vocational offerings in rural areas suggests that distant learning strategies may become a more attractive option for schools in those areas.

Schools with high concentrations of special needs students are somewhat less likely than other schools to make special career-prep programs available.

Overall, students with disabilities participate substantially in vocational education relative to their representation in the high school population. However, schools with high proportions of special needs students (more than 15 percent) are less likely than most other schools to offer the special programs and strategies presumed to reflect high-quality vocational education, including career academies and Tech-Prep (Table 2.9). On the other hand, these activities are also less available in schools with few special needs students (less than 5 percent), many of which are special admissions schools that screen for academic performance and emphasize enrollment in selective four-year colleges.

Students may not have access to their first choice of vocational courses or to a full sequence of courses in their preferred career area.

The issue of access to vocational education has various dimensions, including whether students can actually take the courses they want and in which they are interested. Whether students are either fully informed about their choices or committed to a particular program area is unclear. However, some evidence suggests that they face barriers to pursuing their preferences. For example, focus group discussions conducted with vocational students in 2002 indicate that the courses they had planned to take were often eliminated unexpectedly, particularly the more advanced courses in a sequence. In fact, some appeared to end up in courses for reasons that had little to do with their professed interest in an occupational area. The following quotes from students illustrate what appeared to be a frequent situation for students who were interviewed (Branch forthcoming):

> *I was taking cosmetology [courses], but they cut [them] so I was only in [them] until the 10th grade.*

I wanted to be a chef. When [those courses] got cut, I wanted something challenging so I chose CAD.

They [enrolled me in] child care [courses], which I didn't want, when cosmetology was cut.

I came here because they were supposed to have auto tech, but it had been dropped by the time I came. I ended up taking building maintenance, which they also dropped, so I got stuck with computers.

I was in cosmetology, but it was dropped and they [enrolled] me in home health aide [courses].

These student perspectives are consistent with the decline in the "concentration" of occupational course taking noted earlier and suggest other strategies may be necessary for high school students to have greater options or to pursue advanced vocational course work. "Dual-enrollment" policies that allow students to take college courses for which they also receive high school credit is one possibility, discussed in more detail in the section below.

C. Implementation: Program Quality and Improvement Efforts

While previous laws had other priorities, the two most recent Perkins acts (Perkins II and III) have largely been viewed as efforts to upgrade the quality of vocational education. Federal funds were to be used to improve vocational programs rather than to maintain them, with the latter more clearly a state and local function. To encourage program improvement, Perkins II specified a set of promising strategies and practices that were continued in Perkins III.[20] Although the justification for these approaches in some cases came from early developmental studies, little is known about the effectiveness of these strategies in improving the outcomes of students in vocational programs.[21]

[20]These strategies are conveyed in the Purpose (Section 2), State Plan (Section 122), State Leadership Activities (Section 124), and Local Plan (Section 134) components of the legislation.

[21]Rigorous experimental evaluations have not been conducted to determine the impact of various forms of integration, articulation agreements, efforts to broaden the curriculum to include "all aspects of the industry," greater employer involvement, and so on. The Office of Vocational and Adult Education (OVAE) plans to address some of these gaps by funding experimental studies of particular vocational strategies in the future.

It is nevertheless important to examine the extent to which the Perkins quality improvement approaches have been implemented in schools and classrooms around the country. The prevalence of these strategies is one indicator of the impact of federal vocational policy.

1. Integration of Academic and Vocational Education

"Integration" of academic and vocational education was the cornerstone of Perkins II and remains a major emphasis in Perkins III.[22] This strategy was intended to both improve students' academic and technical skills and move vocational programs closer to mainstream education objectives. The impetus for including integration in the 1990 law was derived from cognitive science studies suggesting that students learn theoretical concepts best "in context" (Silverberg 1993).

Perkins III does not, however, define integration or clarify its primary goal. As a result, over the last decade, a variety of approaches have sprung up under the "integration" banner, encompassing a wide array of activities with sometimes quite different objectives (Grubb et al. 1991; Medrich, Calderon, and Hoachlander 2002). Integration can include strengthening the academic content of vocational classes, providing academic teachers with new, more "applied" ways to deliver instruction, helping students (academic or vocational) develop critical-thinking or problem-solving skills, and other efforts. The flexibility in approach, however, does not guarantee that integration is a core feature of vocational programs.

State agencies, as encouraged by Perkins, continue to place priority on forms of integration.

For the most part, state vocational officials support the concept of integration and state-level activities that promote it. They sponsor professional development conferences and curriculum development efforts and disseminate relevant products. Many states adopt or support particular vocational reform models that advocate integration as a key component, such as the Southern Regional Education Board's (SREB) High Schools That Work (HSTW) initiative or career academies (Stasz and Bodilly forthcoming). Most importantly, states have begun to reference or encourage academic content in vocational course guidelines, as discussed in more detail below. States spend the highest share of state leadership funds—nearly 20 percent nationally—to promote integration (White et al. forthcoming).

[22]Integration is, for example, mentioned as a core strategy for addressing the purpose of the law (Section 2).

At the local level, integration is not widespread but appears to be increasing.

Despite legislative and state encouragement, there is little evidence that integrated curricula are being widely developed or used at the local level or that there is school-based support for integration (Stasz and Bodilly forthcoming). Even so, data from surveys of seniors in eight states suggest that the frequency of activities that draw upon academic skills in vocational classes has been expanding somewhat (Table 2.10). The *level* or rigor of the academic skills students referred to in these surveys is unknown and, certainly, a single essay or math-related assignment is unlikely to enhance students' academic skills—the goal of these efforts. However, compared to four years earlier, higher shares of seniors in 2000 used their oral, written, or math skills to complete multiple assignments in their vocational classes.

Table 2.10
Percentage of Seniors in Eight States Engaging in Applied Academic Activities in Vocational Classes: 1996 and 2000

Activities in 11th- and 12th-Grade Vocational Classes (Among Those Who Took Classes)	1996	2000	Change in Percentage
Made presentation or wrote essay about career of interest			
Ever	47.3	64.0	16.7**
Three or more times	13.9	22.1	8.2*
Made presentation or wrote essay about what is being learned on a job			
Ever	42.1	55.7	13.6**
Three or more times	11.2	18.3	7.1**
Used math skills to complete an assignment			
Ever	68.7	74.7	6.0*
Three or more times	41.1	47.2	6.1*

SOURCE: Haimson 2002. Analysis of the National School-to-Work Evaluation Survey of Seniors in Eight States, Class of 1996 and Class of 1998.

*Statistically significant change between 1996 and 2000 at the 0.05 level.
**Statistically significant change between 1996 and 2000 at the 0.01 level.

Integration is not a more common practice, for several reasons:

- ***Implementing a special program does not necessarily mean emphasizing all of its components.*** Many high schools report having adopted career academies (23.5

percent) or Tech-Prep (47.1 percent), and SREB reports that more than 1,100 schools in 36 states have adopted the HSTW model. But various studies suggest that implementing these integration-oriented initiatives may not actually result in substantial changes in classroom instruction (Kemple 2001; Hershey et al. 1998; Bottoms 2002).

- ***Team-teaching and common planning periods that could support integration are relatively rare.*** Just about one-tenth of high school teachers reported in 2001 that they taught a course jointly with a teacher of another subject. Less than one-quarter of both academic and vocational teachers reported that their school provides weekly planning time during the school day when teachers might collaborate on integration (Table 2.11).

Table 2.11
Percentage of Academic and Vocational Teachers Who Have Opportunities to Collaborate: 2001

Collaboration Opportunity	Academic Teachers	Vocational Teachers
Team-teaching with a teacher of another subject[1]	9.4	12.7
School provides common planning time for teachers each week	21.9	23.9

SOURCE: Stasz and Bodilly forthcoming. Analysis of the High School Study: National Teacher Survey.

[1]These figures somewhat overstate the extent of opportunity for integration because academic teachers may be reporting joint work across academic disciplines, and team-teaching arrangements reported by vocational teachers may be across vocational program areas.

- ***Vocational teachers disagree about the role of academics in vocational curricula, and academic faculty place priority on meeting state academic standards.*** Case studies suggest that integration suffers because the two groups of teachers who can best move it forward are not strongly committed to doing so (Stasz and Bodilly forthcoming). Vocational teachers agree that some fundamental math, reading, and science knowledge is required for students to be successful in vocational courses and in the labor market, but many do not believe that vocational courses should bear significant responsibility for delivering academic content and improving academic achievement. Perhaps as a result, with the exception of basic math skills, vocational teachers across the country are much less likely than academic teachers to report that students' academic competencies (in advanced math, basic and advanced reading, and writing skills) contribute to their grades in the classes they teach. At the same time, academic teachers feel pressured to meet state academic standards,

making them less receptive to alternative instructional approaches such as those promoted by advocates of integration.

- ***There are other barriers to expanding integration.*** Teachers also cite as further barriers the lack of professional development and, where area vocational schools are concerned, the separation of academic and vocational teachers into different facilities (Stasz and Bodilly forthcoming). A recent survey of vocational teachers in the HSTW network revealed that almost one-half said they needed more training in how to integrate reading, writing, math, and science content into their courses; during the previous three years, fewer than 10 percent of them had received more than 20 hours of such training (Bottoms 2002). Even when professional development has been provided to vocational teachers, it often results in their preparing a single project or two- to three-day lesson rather than transforming classroom instruction (Stasz and Bodilly forthcoming, p. 91; Hershey et al. 1999).

While several obstacles hinder further expansion of integrated curricula in American high schools, European nations do not seem to face these same barriers. A recent study suggests that typical vocational curricula in the United States appear to have far less and less rigorous integrated academic content than do comparable curricula from some of Europe's "dual-system" countries (specifically Austria, Germany, and Switzerland), countries that allow students to choose either a technical preparation or a college preparation path for schooling after completion of compulsory education at age 16.[23] These same European countries not only send a majority of youths of high school age to two- to four-year vocational training programs after completing the equivalent of 10th grade, but they also exceed or match U.S. performance on recent international tests of math and science in the equivalent of 12th grade (King forthcoming). One important difference, however, is that the European systems can offer deeper, more rigorous vocational programs because these programs are a separate pathway explicitly chosen by students. In contrast, American students view vocational courses as electives, ones that must be fit into an increasingly rigorous load of academic courses.

School reform is prompting efforts to further strengthen the academic content of vocational activities, and states are responding with new strategies.

State academic reforms are clearly beginning to have an effect on vocational education, as will be discussed in more detail below. Case studies indicate vocational teachers in commu-

[23]The "dual systems" require students to complete a core academic curriculum by age 16 and then to choose between two tracks for further education and training: undergraduate academic degree programs and apprenticeships for occupational training, which typically combine classroom academic and technical course work with alternating days of workplace experience.

nities with high school exit exams are often encouraged to set aside class time for academic test preparation (Stasz and Bodilly forthcoming). Perhaps more importantly as a sign for the future, many state agencies have adopted specific policies that may lead to the addition of more academic content in vocational education, whether it is integrated or not:

- ***More and more, state vocational curriculum guidelines clearly refer to academic skills.*** Many states have developed curriculum guidelines or frameworks for at least some of their vocational programs, although most are voluntary. Within the last several years, an increasing number of states have strengthened their efforts to incorporate academic skills in certain ways:

  - *Reminders and Web links to the state's academic standards as part of vocational curriculum outlines*. Several states list their state academic standards in their vocational curriculum guidelines. A few states, including Arizona and Pennsylvania, have just begun to "crosswalk" (identify commonalities between) a small number of vocational course or program outlines with the state's academic standards. Alternatively, Virginia outlines duties and tasks for each vocational course and has a separate "Related Standards of Learning" (academic skills) list and a document that provides links between the two. Ohio's StandardsPlus Web site (http://www.ohiorc.org/career_tech) connects the state's academic and technical content standards with Web-based instructional materials available to both academic and occupational teachers.

  - *Inclusion of generic basic skills in vocational standards*. For example, all of Georgia's curriculum frameworks feature the same basic skills requirements, such as "performs and applies numerical concepts and calculations and solves problems by choosing appropriately from a variety of mathematical techniques using mental, manual, and technological methods" (http://www.doe.k12.ga.us/edtech/frameworks.html).

  - *Identification of specific academic skills that students are expected to learn in occupational programs*. The Florida standards for the early course components of the Commercial Food and Culinary Arts program have such sections as "Demonstrate Appropriate Math Skills: (1) solve problems for volume, weight, area, circumference, and perimeter measurement for rectangles, squares, and cylinders, (2) add, subtract, multiply, and divide using fractions, decimals, and whole numbers, and (3) determine the correct purchase price, to include sales tax, for a materials list containing a minimum of six items, and (4) demonstrate an understanding of federal, state, and local taxes and their computation" (http://www.firn.edu/doe/dwdframe/fc/pdf/20040103.pdf).

- ***Some states certify vocational courses for academic credit.*** In part to allow students to meet academic graduation requirements without sacrificing vocational enrollments, a number of states have policies that allow at least some vocational courses to count for academic credit. However, the manner in which these policies are implemented is probably key to whether academic content is truly strengthened at the local level. New York State's new approach, which began in September 2001, is exemplary for its rigorous district and state approval process. For a course to be certified for even partial academic credit in New York, it must be jointly planned and delivered by academic and vocational teachers, who must provide a curriculum map to document clearly how the courses meet the core academic requirements of the Regents exams. Oklahoma has a similarly stringent review process: academic standards must be clearly identified in the vocational curriculum, and both academic and vocational staff at the district and state levels must concur before the state board of education approves a vocational course as counting for academic credit. As of 2002, one course had been approved under these state guidelines. On the other hand, in at least one state where individual school boards determined which vocational courses would qualify for academic credit, inconsistencies in how the policy was applied led to its elimination.

States integrate the "all aspects of an industry" approach into their reform efforts, but it does not receive much direct attention.

Both Perkins II and Perkins III called for efforts to move vocational education away from narrow occupational skills training, in part by promoting broader awareness of the careers and industries relevant to a particular vocational program. Under Perkins III, state and local grantees are required to describe in their plans how they will provide students with strong experience in, and understanding of, all aspects of an industry the students are preparing to enter (Section 122). This strategy has largely been interpreted as integrating into vocational courses such topics as planning, management, finance, technical and production skills, underlying principles of technology, labor issues, community, environmental and social issues, and health and safety concerns.

Case studies found little evidence of the use of the term "all aspects of an industry" or initiatives that specifically promote it at the state and local levels (Stasz and Bodilly forthcoming). However, the concept seems to be embedded in other policies and strategies, most notably in state vocational curriculum guidelines where they exist. Florida's performance standards for the introduction to agriscience, technology, and environmental science program offers one example (Table 2.12), but the same general components are included in standards for many of the state's other programs, such as heating and air conditioning technology or commercial foods and culinary arts. Other states with curriculum guidelines also cover these dimensions of industry to varying degrees (review of state Web sites).

Table 2.12
Selected Items from the Florida Department of Education, Student Performance Standards for Introduction to Agri-science, Technology, and Environmental Science Program: 2002

Performance Standard Number	Description
01.02	Describe the importance of agriculture on a work, national, state and community scale.
01.07	Identify the major agricultural production areas of the United States and Florida.
01.08	Describe the diversity of career opportunities in agri-science and technology.
03.03	Describe the technology used in processing and marketing agricultural products.
06.01	Complete a project safely using agricultural tools, machinery, or equipment.

SOURCE: Florida Department of Education, Student Performance Standards (http://www.firn.edu/doe/dwdframe/ag/doc/019921ex.doc).

The "all aspects of the industry" approach is also evident in a recent initiative undertaken by state directors of vocational education to identify the competencies and skills needed for 16 broad career clusters, with the intent of making them available for voluntary use as skill standards (see http://careerclusters.org/). Whether and how these various state-level activities influence local implementation is less clear.

Career and Technical Student Organizations (CTSOs) are regarded as an important integration strategy.

Linked through 10 national associations, state and local CTSO affiliates have long been a popular component of many vocational programs. The organizations provide skill competitions, training, and other after-school activities, as well as classroom resources and strategies that CTSOs encourage participating teachers to integrate into their vocational courses. CTSO efforts are designed to emphasize both building technical skills and developing other competencies, such as teamwork, leadership, communication, critical thinking, and basic academic proficiency. States are permitted to use Perkins funds to support CTSO activities, but they devote a relatively small share—about 7 percent—of their state leadership allocations to do so (see Chapter 5).

Many vocational education teachers are involved in CTSO efforts at the local level, and they emphasize some integration approaches more so than do other teachers. Nationally, more than two-thirds of all vocational teachers report that their classes are linked to a CTSO in some way (Stasz and Bodilly forthcoming). Teachers who are involved with a CTSO are more likely than other teachers to have students listen to lectures, write para-

graphs, take tests or quizzes, and engage in discussion or exploration of careers. CTSO involvement is not associated with other instructional practices, however (Table 2.13).

Table 2.13
Percentage of Vocational Teachers Reporting That Various Student Activities Occur Frequently, by Whether Class Is Linked to a Career and Technical Student Organization (CTSO): 2001

	Percentage of Teachers Reporting Activity Occurs Frequently in Class[1]	
Student Activity	No CTSO Link	CTSO Link
Listen to a lecture	45.8	62.7**
Write a paragraph or more	32.2	42.5**
Receive a homework assignment	33.5	32.8
Take a test or quiz	30.4	43.7**
Use computers	60.5	53.2
Use appropriate instruments, tools, or equipment	64.5	67.0
Work in groups during class	61.5	67.3
Work on extended projects (two or more days)	60.2	52.4
Use commercially available "applied academics" curriculum materials (e.g., CORD, AIT)	11.0	11.4
Discuss or explore careers	17.7	28.3**
Apply academic skills to tasks that might be found in a job or career	61.4	67.9

SOURCE: Stasz and Bodilly forthcoming. Analysis of High School Study: National Teacher Survey.

[1]"Frequently" = one to two times each week or almost daily.

**Statistically different from academic teachers at the 0.001 level.

NOTE: CORD = Center for Occupational Development; AIT = Agency for Instructional Technology.

2. Linkages between Secondary and Postsecondary Education

Along with integration, Perkins III emphasizes the linking of secondary and postsecondary education as a way to fulfill the purpose of the act (Section 2). Such efforts were expected to have two benefits: to improve the quality of secondary vocational education and to provide students with encouragement and incentive to pursue college and advanced training. In practice, these linkages have included collaborations between secondary and postsecondary faculty, arrangements that allow high school students to earn college credit, and various forms of career development and planning.

While Title II, the Tech-Prep Education Act, is the main vehicle in Perkins III for developing these linkages (discussed in Chapter 4), the law encourages strengthening connections across levels more broadly. Many of the components of Tech-Prep, for example, are allowable activities under state and local uses of the basic state grant. State officials spend about 11 percent of basic grant state leadership funds on promoting secondary-postsecondary linkages (see Chapter 5).

Secondary vocational teachers have stronger connections to postsecondary faculty than do academic teachers.

The Perkins Act is the only federal legislation that encourages and provides financial assistance for collaboration between members of secondary and postsecondary faculty, and these efforts have had some measurable results.[24] Nationally, vocational teachers report more collaboration with their postsecondary colleagues than do secondary academic teachers (Table 2.14). These differences are even more pronounced when "any

Table 2.14
Percentage of Secondary Teachers Who Interact Frequently with Postsecondary Faculty or Staff, by Type of Activity: 2001

	Percentage Interacting Frequently with Postsecondary Faculty/Staff[1]	
Type of Activity	Academic Teachers	Vocational Teachers
Plan overall course curriculum	6.9	7.0
Plan specific lessons, projects	7.7	6.9
Share technology, lab, equipment	8.0	14.2**
Participate in joint professional development	10.6	14.6**
Serve on joint advisory committees	5.6	9.0**
Discuss students' preparation for postsecondary study	6.2	13.4**
Work on articulation agreements	5.0	8.4**
Exchange employer contacts	3.2	15.2**

SOURCE: Stasz and Bodilly forthcoming. Analysis of High School Study: 2001 National Teacher Survey.

[1]"Frequently" = at least three times during the year.

**Statistically different from academic teachers at the 0.001 level.

[24]Upward Bound, one of the federal TRIO programs that promotes college enrollment and persistence among low-income high school students, does not typically involve collaboration between high school and college academic faculty. Moreover, that program serves a relatively small number of students.

interaction" is counted; for example, 35.3 percent of vocational teachers, compared to 20.9 percent of academic teachers, reported having worked with postsecondary faculty at least once on course curricula during the 2001 school year (Stasz and Bodilly forthcoming). Case studies, however, turned up far fewer examples of these types of activities and less extensive collaboration than suggested by the national survey. At the local level, the most visible type of collaboration was in developing and maintaining articulation agreements (Stasz and Bodilly forthcoming).

Where these coordination activities are most extensive, however, they seem to offer several benefits (Hershey et al. 1998). Opportunities to meet across education levels—and within groups organized by vocational program area—can reduce the isolation of secondary vocational teachers, increase their professional growth, and provide them with channels for exchanging information on successful practices. The process of articulating courses can result in the upgrading and standardization of vocational curricula, because high school vocational educators are encouraged to adopt the course outlines and competencies of community college programs.

Articulation agreements and "dual-enrollment" programs are becoming more common, but few vocational students are taking advantage of these options.

While neither articulation nor dual-enrollment arrangements are new, there is some evidence that these strategies, which are designed to help students earn college credits while they are still in high school, are becoming more prevalent (Bailey, Hughes, and Karp 2002):[25]

- ***Articulation agreements*** allow a student to earn college credit or advanced standing in a postsecondary program for skills acquired in high school courses. Typically, high school courses are "articulated" when their content is aligned with or made similar to that of comparable community college courses.[26] More than one-third of all high school vocational teachers report that their first course of the day has an articulation agreement (Stasz and Bodilly forthcoming), but information provided on state Web sites suggests articulation covers a much larger share of vocational courses.
- ***Dual enrollment*** enables a student to enroll in a course on a college campus while he or she is still in high school and receive both high school and college credit for

[25]Articulation has been in practice in some states since the 1920s and was promoted by the National Institute of Education (a part of the U.S. Department of Health, Education and Welfare) in the early 1970s (Hershey et al. 1999). Dual-enrollment programs have been in existence for more than 30 years (Bailey, Hughes, and Karp 2002).

[26]In some states and communities, after completing an articulated high school course, students may have to pass a college competency test, complete a certain number of college credits, or enroll in a related community college program in order to receive the articulated college credit. Students who attend a postsecondary institution outside the scope of the articulation agreement do not receive articulated college credit.

the course. These opportunities are touted as a way for students to increase the rigor of their high school curriculum and to experience the demands of college-level work. Although dual-enrollment programs generally open the door to higher-level academic courses, some have argued that the programs could also provide access to more advanced vocational course work, particularly in light of secondary school budget pressures that may reduce the availability of higher-cost vocational courses. All but three states offer some form of dual-enrollment program (Education Commission of the States 2001), and approximately 80 percent of all public high schools report offering opportunities for students to earn college credit from local postsecondary institutions or distance learning providers (Levesque forthcoming).

Although these two options are already broadly and increasingly available, neither seems to benefit large numbers of vocational students. While no national data exist, studies suggest that dual-enrollment programs typically serve the most academically talented high school students in primarily academic courses (Bailey, Hughes, and Karp 2002). These studies also indicate that most students enrolled in high school articulated vocational courses are either unaware of or fail to take the steps necessary to be awarded the articulated college credit (Hershey et al. 1998; Bragg 2001). According to the last national estimate, only about 15 percent of students in articulated vocational courses earned college credit (Hershey et al. 1999). It appears that more work on implementation will be necessary for these secondary-postsecondary linkages to serve substantial numbers of vocational students. Little is known so far about the impact of articulation and dual enrollment on students' enrollment decisions.

College and career planning activities are widely available in schools, but their utility is uncertain.

Perkins III supports career development efforts in a variety of ways. Most directly, Perkins funds a state network of entities—now called "America's Career Resource Network" (ACRN)—that gathers and provides schools with information on occupations and employment (Section 118). States are permitted to use state leadership funds to improve career guidance, and about 9 percent of these funds nationally are used for these purposes (see Chapter 5). Unlike Perkins II and its predecessors, however, the 1998 law does not set aside funds specifically for career counseling and development activities; instead local districts are free to use their Perkins grants for those activities.

In part because of the emphasis on these activities in prior Perkins legislation and the School-to-Work Opportunities Act of 1994, many career development activities are being offered in American high schools, and some practices appear to be growing (Table 2.15). Job shadowing and worksite visits were particularly emphasized in school-to-work implementation (Hershey et al. 1999), so it is not surprising to find these activities increasingly prevalent in the latter part of the decade.

Table 2.15
Percentage of High Schools Offering Various Types of Career Development Activities: 1996 and 2000

Type of Career Development Activity	Percentage of High Schools 1996	2000
School visits by employers	88.2	87.7
College guidance counseling	98.2	94.7*
Occupational guidance counseling	84.1	84.8
Career interest inventories	94.3	92.8*
Career assessments	71.9	75.0*
Individualized career plans	53.6	66.6*
Career information centers	80.2	76.9*
Job site visits	74.7	83.4*
Job shadowing	42.2	64.3*

SOURCE: Stone and Plank 2003. Analysis of the National Longitudinal Survey of Youth School Administrator's Survey, 1996 and 2000.
*Difference between 1996 and 2000 is statistically significant at the 0.05 level.

The value of these and other school activities in helping students plan for careers is unclear, however. A study of 1998 high school seniors in eight states suggests that some of the most prevalent activities—e.g., career interest inventories, business and industry speakers—are not particularly helpful to students (Table 2.16). On the other hand, more than half of the students who took vocational courses in their junior or senior years of high school considered those courses to be "very helpful" in clarifying their career goals. Students also found some workplace activities, such as job shadowing and paid jobs or internships, to be helpful. Although counselors, educators, and parents have debated the importance of having students choose a career path in high school, in fact, many high school students have already made some career decisions. In a recent national poll, almost three-quarters of high school juniors and seniors said they had tentatively picked out a career to pursue upon leaving high school or college (Ferris State University 2002).

In many states, college scholarship programs for "high-performing" vocational students are credited with expanding students' horizons and the image of vocational education.

Many states have scholarship programs open to all high school students who qualify (regardless of program of study), but several states (e.g., Florida) have a particularly promising strategy that is credited with raising the stature and performance of vocational stu-

Table 2.16
Percentage of Seniors Who Participated in Various School Activities and the Perceived Value of the Activities in Helping to Clarify Those Students' Career Goals: 1998

	Among Those Who Participated, Percentage Who:			
School Activity	Ever Participated	Reported "Very Helpful"	Reported "Somewhat Helpful"	Reported "Not Helpful"
Career interest questionnaire	81	18	58	24
Outside speakers discussing career options	63	37	51	12
Technical or vocational courses	48	57	33	10
Career exploration classes	33	46	43	11
Job search or workplace behavior class	54	54	37	8
Group workplace visit	54	41	45	14
Job shadowing	45	70	23	7
School-based business	15	44	43	14
School club	62	36	39	25
School sports	62	36	30	34
Paid job found through school	18	61	29	10
Unpaid job found through school	20	53	34	13
Other training at a workplace	17	64	29	7

SOURCE: Haimson 2002. Analysis of National School-to-Work Evaluation Survey of Seniors in Eight States, Class of 1998.

dents. To be eligible for the Florida Gold Seal Vocational Scholars Award, a student must earn the following (see http://www.firn.edu/doe/bin00072/gsvrequire.htm):

- A 3.5 grade-point average (GPA) across a minimum of 3.0 occupational credits in one vocational program area (e.g., the student must be an "occupational concentrator");
- A cumulative GPA of 3.0 in 15 required core academic courses; and
- A minimum score on the standard college entrance exams (e.g., ACT, SAT).

Recipients can receive up to a two-year scholarship award equal to 75 percent of the tuition and fees at a Florida public postsecondary institution.[27] To receive the award in their second year of college, students must maintain a cumulative GPA of 2.75. In

[27]Students may also attend a private postsecondary institution in Florida, but the scholarship award is fixed at 75 percent of the average tuition and fees at a comparable Florida public institution.

FY 2000, more than $5 million was disbursed in scholarships to 4,102 students, although the actual impact on students' college enrollment decisions is unknown.[28] Arkansas and Washington State have similar merit scholarship programs for vocational students. These types of scholarship programs can underscore that vocational education can be a pathway to college and that high achievement in both vocational and academic courses is desirable and worth rewarding.

3. Challenging Vocational and Technical Skill Standards

Unlike the 1994 Amendments to Elementary and Secondary Education Act or the 2001 No Child Left Behind Act, Perkins III does not explicitly require states to develop standards for vocational courses and programs. However, the law does mandate state reporting to ED on core performance indicators, including "student attainment of challenging State-established academic and vocational and technical skill proficiencies" (Section 113(b)(2)). This language implies that states must have some kind of standard against which to judge individual students' vocational skill attainment and some way to measure that attainment. Given that state standards and related skill assessments have become the foundation of federal policy to improve academic achievement, the Perkins provisions may be read as a step toward using a similar model for vocational education.

Standards and guidelines are not new to vocational education and training. They have their origins in the craft guilds of the early colonial days and since then have been developed with business and industry, the military, educators, and state and federal officials playing substantial roles at various times but not always in coordinated fashion (Chung forthcoming). More recently, there has been such an abundance of occupational standards that the field has been characterized as "an embarrassment of riches" (Wonacott 2000). The larger issues are how these standards are organized and whether they can improve the quality of instruction and student performance.

Until recently, standards-based reform has not been a major effort in vocational education.

Most states have been engaged to some extent in establishing occupational skill standards during the last two decades. In doing so, states have taken a variety of routes: developing their own standards, endorsing those created by business and industry groups, adopting guidelines created by multistate consortia, or a combination of these approaches (Sheets forthcoming; Chung forthcoming). The standards themselves can be at the level

[28]National data, for example, suggest that many "high-performing" vocational students—even those who do not have access to special state scholarship programs—enroll in college (Agodini et al. forthcoming).

of courses (e.g., introduction to word processing), occupations (e.g., office assistant), or clusters of occupations (e.g., business). Some are broad statements of knowledge and skills required, while others are more commonly divided into job-specific duties or task lists of activities that students should be able to perform for entry-level employment following their completion of a course or program. This diverse approach is similar to that used for academic standards. But several factors have prevented states from promoting systemic reform in vocational education with standards as the centerpiece:

- ***Most states have some vocational curriculum guidelines, but often they are not mandatory.*** In contrast to academic standards, vocational standards are mandated in only a few states. Other states regard their occupational standards as models or recommended frameworks for developing curriculum at the local level. These states adopt different approaches to encourage use by local Perkins grantees, mostly through "approving" programs for state or federal funding or for special certification status. In some states, the primary incentive is that schools offering programs designed around state standards can award students extra credentials—state skill certificates or "endorsements" on their high school diplomas—if the students meet or exceed the standards.

- ***"Coverage" of the standards is variable.*** Although many national or regional industry groups have developed guidelines for entry-level workers, there are other occupational areas in which no industry standards exist. Similarly, states with curriculum guidelines rarely have them for all of the secondary occupational programs offered. Two states are exceptions: Alabama has developed guidelines for 140 courses of study, and Virginia has created task lists for all 225 secondary vocational courses approved in the state. When only a share of programs are covered by standards or curriculum guidelines, it is difficult to impose a standards-based reform structure where states hold local programs accountable for meeting defined skill benchmarks (Chung forthcoming).

- ***Assessments are underdeveloped.*** Far fewer states have assessments than have standards, particularly statewide, external procedures for ensuring that students attain the identified competencies. Some states have rubrics to help teachers judge students' skills against the duty or task lists. But in many other states, individual instructors are responsible for assessing whether a student has demonstrated enough of the listed competencies at an appropriate level of skill. One reflection of the relative lack of state vocational assessments is the way in which states report to ED on the vocational-technical skill performance indicator: 38 states rely on GPA and course or program completion or their own local assessment procedures, approaches that federal policymakers have considered unreliable when it comes to measuring the progress of academic reforms (Table 2.17).

Table 2.17
Number of States Using Different Measures of Vocational-Technical Skill Attainment for Federal Performance Reporting: 2001

Type of Measure	Number of States
National or state standards and assessment systems	16
Local assessment systems	13
Vocational-technical GPA	10
Vocational-technical course completion	8
Program completion	7

SOURCE: White et al. forthcoming. Analysis of Perkins performance data, U.S. Department of Education, Office of Vocational and Adult Education, 2001.

Some states have comprehensive or nearly comprehensive vocational testing. Pennsylvania, for example, uses tests developed by the National Occupational Competency Testing Institute (NOCTI) for 90 of its 140 programs, and industry certification and state licensure exams for the rest of its vocational testing. For several years, North Carolina has been developing an online system of test items that local grantees can administer to students at the end of their courses; by 2002 it included items based on course blueprints for over 95 percent of all state-approved and funded vocational courses and programs (Sheets forthcoming).

- ***Vocational courses are elective not required courses.*** Despite a desire to improve programs and provide marketable credentials to students, state officials point out that there are limits to how rigorous vocational programs can be. If vocational courses have too many prerequisites or require too high a level of technical or academic skill, students who might benefit from occupational training would be left out and enrollments could decline. A report on the implementation of national skill standards in a small number of schools suggests that upgrading the quality of vocational programs will require more careful screening and selection of participants, an outcome somewhat inconsistent with the Perkins priority on providing broad access to vocational programs (Haimson and Hulsey 1999).

- ***Resources to support the development and implementation of standards are limited.*** According to state officials, federal support for vocational skill standards has declined (Chung forthcoming). The Vocational-Technical Education Amendments of 1984 (Perkins I) allowed states to use substantial amounts of Perkins funds for program improvement and innovation including developing skill standards. Perkins II in 1990 restricted these discretionary funds at the state level but provided resources to establish a National Skill Standards Board (NSSB), intended to do much of the

work involved in establishing occupational standards. However, by the time Perkins III was passed in 1998, the NSSB had released only one set of skill standards, and the list of activities states were required to support under Perkins had grown. These required activities did not specifically include the setting of standards, although such efforts could be accommodated.

Even states with state-level support for standards consider it difficult to find the time and resources to convene industry and teacher representatives, to set or upgrade standards and develop assessments, and to provide the necessary professional development to teachers (Sheets forthcoming). Smaller states, with small Perkins allocations and often very limited state vocational education budgets, place developing and implementing standards lower on their priority lists because of resource constraints (Chung forthcoming).

State interest in using standards and external assessments to improve vocational education is growing.

There are, of course, states that have already surmounted these challenges to some extent and others that have committed to doing so. For example, Florida and Utah have moved toward performance-based funding of vocational programs. North Carolina's test-item bank and online, secure process for assessing its programs is now being implemented (Sheets forthcoming). A large share of states report that in the next few years they intend to use accountability data to reward and sanction districts or schools for the performance of their vocational programs (see Chapter 5).

Perhaps most indicative of this movement toward using standards and assessments is the undertaking of the National Association of State Directors of Career and Technical Education. The Career Clusters Initiative will ultimately identify a set of knowledge and skills and related assessments for 16 broad groupings of occupations ("clusters") that states or individual programs can voluntarily adopt. Current partners in these efforts include the American Institute of Architects, the National Aeronautics and Space Administration (NASA), Sony Electronics, as well as numerous postsecondary institutions (see http://careerclusters.org/index.htm). Although built upon industry and existing state standards, this effort is likely to take some years to come to fruition.

The role of industry in vocational standards may be shifting.

For several decades, vocational legislation has promoted the involvement of employers in local programs as a way to ensure quality instruction (see Section 5 below). However, the nature and level of that involvement appears to be changing, from local to state or even national participation.

- ***Local employers provide relatively little input in competency lists and standards.*** Case studies suggest employer involvement varies across states and communities. Nationally, however, vocational school staff do not report that business and industry play a particularly influential role in shaping competency lists that provide the standards for classroom instruction (Table 2.18). Because these lists are often provided to programs by state vocational officials, local practitioners may be unaware of the contributions that employers at the state level make.

Table 2.18
Percentage of High Schools with Occupational Programs Indicating That Industry Provided Input in the Development or Adoption of the Programs' Skill Competency Lists: 1999

	Percentage of High Schools Indicating Some Industry Input	
Competency Lists Developed for:	Any	Industry and Educators Provided Equal Input
All occupational programs	52	17
At least half of their occupational programs	70	25
At least one of their occupational programs	77	35

SOURCE: Parsad and Farris 2000. Analysis of Fast Response Survey: Vocational Programs in Secondary Schools, 1999.

- ***States generally include employers in developing state vocational standards.*** Many states report working to adopt industry standards as the foundation for some vocational programs (Stasz and Bodilly forthcoming). Where states have developed standards on their own, they have typically convened groups of business and industry representatives with vocational educators to do so (Chung forthcoming). Over time, then, employers may have a larger impact on shaping curriculum at the state level than at the local level.

- ***Industry certification programs are popular, involving employers at the national level.*** Perkins II, by encouraging the development of national skill standards, also emphasized national industry efforts. Although the NSSB's output has been modest (Chung forthcoming), other employer groups have promulgated competency guidelines, and vocational teachers are beginning to respond to them. In fact, just under one-quarter of all vocational teachers say that industry standards exist for at least one of their courses (Stasz and Bodilly forthcoming). But in the case of these standards, most of the work of employers was at either the regional or national level.

This shift in the role of employers may reflect a trend, first promoted in the School-to-Work Opportunities Act, toward providing "portable" credentials to students who complete vocational programs. In a national economy constantly responding to global competition, it was argued that workers may need or want to move outside of their local communities to pursue job prospects. Vocational programs would therefore need to ensure that the skills they impart to students are desired by a broad set of employers in industry and that any certificates students earn when they complete a program will have currency in the larger labor market.

4. Enhancing Use of Technology

Technology has long been a mainstay of vocational education programs and a common concern among educators and policymakers (Boesel et al. 1994a). Vocational programs have been criticized for failing to keep up-to-date with the equipment and technological demands of the labor market, while vocational educators have often argued that doing so in a continuously changing economy requires substantial resources. Perkins III places additional importance on technology, encouraging teacher training on "state-of-the art" technology (Section 135) and the availability of vocational programs that prepare students for fields that require high-level skills and pay high wages (Section 122).

Perkins has substantial influence on expanding and upgrading technology and equipment.

In many ways, Perkins III has its most direct effect on this area of program improvement. At the local level, the majority of Perkins funds are spent on upgrading equipment and instructional materials to keep them current (see Chapter 5), as are a substantial share of Tech-Prep funds (Hershey et al. 1998). Moreover, state officials spend about 11 percent of their state leadership funds on expanding the use of technology (White et al. forthcoming).

States have made the expansion, development, and use of technology in education a priority, although much of this effort is not specific to vocational education. In fact, many state technology policies apply to all students or represent efforts not necessarily connected to vocational education (Stasz and Bodilly forthcoming). For example, initiatives such as the "Digital High Schools" in California or "Virtual High Schools" in Florida are not targeted to students interested in technology careers or intended to be more than strong academic programs, even with a technology emphasis. High schools in general have sought to ensure computer access for all students. Vocational courses may or may not benefit from these efforts.

Keeping technology current and well-maintained remains somewhat of a problem, but many programs have recently received new equipment and materials.

There are many dimensions to providing "high-quality" technology in vocational courses, and some of them present an ongoing challenge (Table 2.19). Nationally, the highest proportions of vocational educators report a substantial problem with ensuring that technology is current or state-of-the-art (40.7 percent), well-maintained (38.0 percent), and available in numbers adequate to serve the students in the class (37.2 percent).

Table 2.19
Percentage of Vocational Teachers Reporting That the Condition of Technology in Their Class Is a Serious or Moderate Problem: 2001

Condition	Percentage of Vocational Teachers
Availability of technology	28.2
Availability of technology in adequate numbers	37.2
Maintenance of technology	38.0
Appropriateness of technology	29.5
Currentness of technology	40.7
Alignment of technology with curriculum	22.6
Convenience of location of technology	26.4

SOURCE: Stasz and Bodilly forthcoming. Analysis of High School Study: National Teacher Survey.

At the same time, however, the survey results do not suggest dire technology deficits or a lack of attention to the material needs of vocational programs. Almost three-quarters of vocational teachers have received new or updated equipment, tools, and instruments in the last two years, suggesting that many programs have recently had opportunities to upgrade their technology (Table 2.20).

These current figures may reflect that the availability of technology and equipment for vocational programs has improved in the last decade. Fewer vocational teachers in 2001 than in 1992 considered "access to computers" (22.5 percent vs. 34 percent) or "adequacy of equipment" (26.1 percent vs. 39 percent) a "serious" or "moderate" problem (Stasz and Bodilly forthcoming).

Table 2.20
Percentage of Vocational Teachers Receiving New or Updated Materials, Instruments, and Equipment in Last Several Years: 2001

Type of Supplies	Percentage of Vocational Teachers	
	Within Last Two Years	Two or More Years Ago
Curriculum standards	74.7	25.3
Curriculum materials	72.0	28.0
Assessments	77.1	22.9
Computers	61.8	38.2
Other instruments, tools, equipment	73.6	26.4

SOURCE: Stasz and Bodilly forthcoming. Analysis of High School Study: National Teacher Survey.

Use of the Internet seems to be growing, but distance learning has not been applied as a common strategy so far.

Policymakers and educators generally agree about the importance of building a computer literate society, and vocational education is clearly key to that effort. On average, 54.5 percent of vocational teachers report that students in their classes use computers "frequently" (e.g., one to two times each week or almost daily) (Table 2.21). Among

Table 2.21
Percentage of Vocational Teachers Reporting Use of Computer- and Technology-Related Instructional Activities in Their Class: 2001

Activity	Percentage of Vocational Teachers Reporting Frequency of Activity[1]		
	Never	Occasionally[2]	Frequently[3]
Use computers	8.2	37.3	54.5
Use Internet to conduct research	13.9	61.5	24.6
Receive instruction via distance learning	85.7	11.7	2.6
Use technology at a local college	86.5	12.4	1.1
Use technology at a local business	72.1	22.8	5.1

SOURCE: Stasz and Bodilly forthcoming. Analysis of High School Study: National Teacher Survey.

[1]"Frequency" is reported for teachers' first vocational class of the day.
[2]"Occasionally" = one to two times each semester or each month.
[3]"Frequently" = one to two times each week or almost daily.

vocational teachers, those who teach agriculture and home economics were least likely to have students use computers "frequently," while those who teach technical and technology education or industrial arts were most likely to have students using computers as part of instruction. Other fields (e.g., business, health, marketing) fall somewhere in-between (Stasz and Bodilly forthcoming).

Certain newer forms of computer use and technology are of particular interest to policymakers, primarily because of their ability to expand educators' capacity to provide instruction. About one-quarter of vocational teachers report that they "frequently" have students use the Internet to conduct research (Table 2.21), a proportion that may be roughly comparable to that reported by academic high school teachers.[29]

Distance learning also has potential applications for vocational education, particularly in providing students with greater choice of and access to courses.[30] However, national survey results suggest that relatively few vocational teachers ever have their students receive instruction over the Internet or other communication media, and only 2.6 percent do so "frequently." This level of use stands in sharp contrast to the prevalence of online technical training for adults in the military and the private sector, where it has been demonstrated that it is both feasible and practical for students to learn occupational competencies in other than a strictly traditional classroom setting (DuBois 2002). Distance education is a growing component of postsecondary education, and increasingly used by workers seeking to upgrade their skills (Greene and Meek 1998). At the high school level, however, more attention has been directed to "Virtual High Schools," such as those in Florida, and other efforts focused on making high-level academic course work available to broader groups of students.

5. Employer Involvement

For several decades, federal policy has sought to expand the involvement of employers in vocational programs. Because local employers are, in many ways, still considered the primary consumers of secondary vocational education, they are expected to have an incentive to ensure the technical quality of vocational programs. Perkins III encourages local grantees to involve employers in designing, implementing, and evaluating programs, and in providing workplace experiences for students (Section 135).

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[29]Although not based on a directly comparable survey, data from NCES suggests that about 40 percent of all secondary teachers have students perform Internet research "to a moderate or large extent." This figure includes both middle and high school teachers, and both academic and vocational teachers. Moreover, the NCES estimate is more inclusive of both "frequent" and "less frequent" activity (see Rowand 2000).

[30]As discussed previously, for example, students in rural areas appear to have access to a smaller range of occupational programs and practices.

In defining skill needs for high school students, however, the priorities of employers have become less clear. Some large trade groups traditionally supportive of vocational education invoke the value of basic academic skills, higher-order thinking skills, and such "soft" skills as communication, teamwork, and work ethic. When these employers call for more technical skills or a more highly skilled workforce, they often refer to the number of college graduates completing degrees in math, science, and technology, not the number of high school graduates with vocational training. For example, a recent survey conducted by the National Association of Manufacturers concludes that "the major areas of concern have shifted from technology skills back to the fundamentals, with basic employability skills cited as the number one deficiency for both current hourly workers and applicants for hourly positions. Poor reading, writing, math, and communication skills were also cited as significant concerns" (National Association of Manufacturers 2001).

There are, of course, other perspectives on the relative importance of basic skills versus occupational skills. Smaller businesses, which make up a large share of U.S. employers and have fewer in-house training resources, have typically drawn more heavily on high school vocational programs for new employees. The shifting priorities, however, may have implications for the evolving nature of vocational education and the role of employers.

Vocational educators report interacting with local employers in a variety of ways.

Not surprisingly, vocational teachers have significantly greater contact with representatives of business, industry, and labor than do academic teachers. For vocational teachers, the most common forms of collaboration include referring students for job placements, having employers make presentations to students in class, having students visit employer work sites, and discussing workplace skill requirements with representatives from business and industry (Table 2.22). Compared to the small proportion of high school vocational teachers (8.1 percent), a large share of academic teachers (41.9 percent) had no interaction with employers or labor groups in 2001. Vocational teachers in vocational high schools and area vocational centers had more contact with employers than did teachers in comprehensive high schools (Stasz and Bodilly forthcoming).

The existence and vitality of local advisory committees of employers vary across and within states.

One of the most traditional forms of employer involvement has been serving on vocational advisory committees. Some states reported in 2001 that they continued to require school- and program-level advisory committees (Stasz and Bodilly forthcoming), although Perkins III no longer requires such committees. According to the National Employer Survey conducted by the Census Bureau in 2000, 14.1 percent of all employers reported

Table 2.22
Percentage of Teachers with Frequent Contact with Representatives of Business, Industry, and Labor, by Type of Activity: 2001

Type of Activity	Percentage of Teachers Reporting Frequent Contact[1]	
	Academic Teachers	Vocational Teachers
Work on advisory committee	6.9	23.8**
Have employers make class presentation	7.8	31.6**
Have employers review student work	2.5	8.7**
Discuss curriculum/standards	2.6	16.4**
Receive equipment/materials	4.9	16.5**
Discuss labor market information	3.0	17.3**
Discuss employee skill needs	5.1	27.4**
Visit employer work site	2.6	27.4**
Refer students to employers for placement	5.4	40.5**
No activity	41.9	8.1**

SOURCE: Stasz and Bodilly forthcoming. Analysis of High School Study: National Teacher Survey.

[1]"Frequent" = at least three times during the year.

**Statistically different from academic teachers at the 0.001 level.

being a member of a vocational advisory committee, although the survey did not distinguish between participation in secondary or postsecondary vocational programs (Bureau of the Census 2002).

At the local secondary level, vocational advisory committees are common but not uniform in their existence or the extent of their activities. Just over half (57.5 percent) of vocational teachers reported "ever working" with employers on an advisory committee in 2001 (Stasz and Bodilly forthcoming), and only 23.8 percent say they do so "frequently" (Table 2.22). Case studies suggest that advisory committee activity is more consistent in states that have emphasized employer involvement (e.g., Michigan and Ohio), and more variable in states that do not consider this strategy a priority (Stasz and Bodilly forthcoming).

Local employers play a limited role in shaping vocational programs.

Despite some participation through advisory committees or other forums, local employers do not appear to have a significant effect on local vocational programs. As noted in an earlier section, based on one survey, local employers do not contribute substantially to developing or adopting skill lists or curriculum standards. Another survey suggests a simi-

lar result: only about one-quarter or fewer vocational teachers report that they received a "moderate" or "great" amount of employer input on various aspects of their class, such as the selection of instructional materials or equipment, standards or competencies for the course, or information on industry skill requirements that could be reflected in course activities (Table 2.23). This is an important finding, because many have argued that consulting with local employers is the best way for vocational education to prepare students for local jobs.

Table 2.23
Percentage of Vocational Teachers Reporting Moderate or Great Employer Input in Their Class: 2001

Type of Input	Percentage of Vocational Teachers
Review of overall curriculum	25.8
Advice on selection of textbooks, workbooks, and other curriculum materials	19.2
Advice on selection of computers	10.3
Advice on selection of instruments, tools, or other equipment	20.2
Help in setting standards for the class	20.0
Review of student work	11.1
Advice on industry skill requirements	28.6

SOURCE: Stasz and Bodilly forthcoming. Analysis of High School Study: National Teacher Survey.

NOTE: Extent is reported for teachers' first vocational class of the day.

The limited amount of local employer involvement in guiding instruction may reflect the way in which vocational educators are responding to several factors. First, as noted earlier, states have expanded their development and dissemination of vocational skill standards—sometimes including guidance on equipment, student work, and expected skill outcomes—and much of this work was accomplished with employer input at the state level (Stasz and Bodilly forthcoming). Knowing that their competency skill lists were derived from either state- or national-level skill standards, teachers may not believe local employer advice is necessary to fine-tune instruction. Second, the increase in articulation agreements, particularly those that are statewide, may be leading to greater standardization of vocational curricula (Hershey et al. 1998), which may also lessen the extent to which teachers feel they need to—or can—modify instruction to meet local employer needs. Finally, because many vocational students plan to attend college (some out of state), teachers may not view their programs as primarily preparing students for the local labor market. This situation contrasts sharply with vocational education at the postsec-

ondary level, where participants are more clearly engaged in training in the same community in which they work and where employer involvement is considerably deeper (see Chapter 3). For these reasons, it is unclear exactly how vital local employer involvement is at the secondary level.

6. Teacher Quality

Teacher quality has increasingly become a focus of policymakers' interest in regular K–12 education, but less attention has been paid to how well vocational teachers are being prepared for their jobs. The availability, experience, priorities, and practices of teachers can be expected to affect the quality of instruction and therefore of vocational education overall. Perkins III, like its predecessors, underscores the value of the vocational teaching workforce largely by requiring state and local grantees to provide professional development to vocational educators. This professional development can, however, include both in-service and preservice training (Section 135).

Larger issues concerning the preparation and hiring of vocational educators have become increasingly important as the economy and federal vocational policy have changed. Over the last decade, federal legislation has tried to guide secondary vocational programs in new directions—to strengthen linkages with postsecondary programs, to integrate academic and vocational instruction, to broaden instruction beyond narrow job skills training, and to coordinate with business and industry. Perkins III also contains accountability provisions that place greater emphasis on helping vocational students meet state academic standards and enter postsecondary education not just obtain entry-level jobs. These policy objectives potentially require both vocational teachers seeking entry into the profession and those already employed to assume new roles and learn new skills. During the same period, the labor market for skilled workers fluctuated substantially, possibly making the alternatives to teaching vocational education more appealing. These issues of teacher supply and qualifications are important to the ongoing development of the field.

Not surprisingly, vocational teachers are more likely to have industry experience than other secondary teachers but continue to be less academically prepared.

Unlike the specifications for academic teachers in the No Child Left Behind Act, the Perkins Act does not require grantees to define a highly qualified vocational teacher or to set goals for ensuring that students in vocational programs have access to one. Two factors that might be important in those qualifications are industry experience and academic background. Because vocational education is rooted in training for jobs and family life directly after high school, it historically placed great value on teachers' occupational

skills; educational background was considered less important than practical experience. Current federal vocational policy, however, emphasizes improving the academic achievement of vocational students. In this climate, the academic skills of vocational teachers may be of increasing importance, although it is not known how these skills translate into effective teaching practice and student achievement in a vocational setting.

- ***Among new teachers, those who are in vocational fields are more likely to come from industry.*** Vocational teaching continues to draw men and women with other work experiences. More than one-third of new vocational teachers were working ("had industry experience") as their main activity during the year before being hired, compared to 9.7 percent of new teachers in other fields (Table 2.24). Statistically, these proportions did not change over the last decade, but their accumulation would result in a much higher share of vocational teachers overall having come from industry, compared with teachers of other subjects.[31] However, including both new entrants and those more experienced, similar proportions (about one-quarter) of vocational and nonvocational teachers had at least some work experience outside of teaching during the previous school year or summer (Levesque forthcoming).

- ***Vocational teachers remain less likely than other high school teachers to hold a baccalaureate degree.*** Although not a perfect proxy, having a baccalaureate degree or higher can be considered an indicator of academic competency. While virtually all nonvocational high school teachers possess those credentials, about 9 percent of the vocational teacher workforce does not—a proportion that has held steady over

[31]Although it appears that the proportion of new vocational teachers who had industry experience increased between 1991 and 2000, because the sample sizes are small, the differences are not statistically significant. Similarly, the sample sizes were too small to estimate differences in industry experience between teachers in comprehensive and vocational schools.

the last decade (Table 2.25). Vocational teachers without this educational credential are concentrated in vocational high schools and area vocational centers, where the emphasis on vocational instruction is more intensive.[32]

These patterns suggest a possible conflict between federal objectives and state and local hiring policies. The federal emphasis on academic support in vocational education appeared as early as the 1990 Perkins II. Yet during the last decade states appear to have relaxed their baccalaureate degree requirements for certification, for either all or specific subgroups of vocational teachers (Table 2.26). Nationally, the proportion of states requiring that vocational teachers have at least a baccalaureate degree fell from 40.2 percent in 1988 to 23.8 percent in 1998. The lowering of state requirements may be a response to perceived shortages of vocational teachers, as discussed later.

- ***Candidates for vocational teaching positions are less academically prepared than their counterparts who seek other teaching jobs.*** Given the way that fed-

[32]In fact, the overall proportion of vocational teachers without baccalaureate degrees is likely to be higher than 9 percent. The sample on which the teacher surveys are based somewhat underrepresents area vocational centers, which are more likely to hire teachers without that credential.

Table 2.26
Percentage of States with Specific Requirements for Vocational Education Teaching Certification, by Region: 1988 and 1998

	Percentage of States in Region with Requirement					
	Require Baccalaureate for All Vocational Education Teachers		Exempt Trade and Industry Teachers from Baccalaureate Requirement		Teachers Can Substitute Work Experience for Baccalaureate	
Region[1]	1988	1998	1988	1998	1988	1998
Northeast	20.0	11.1	0.0	25.0	20.0	25.0
West	37.5	12.5	0.0	0.0	12.5	25.0
South	20.0	13.3	20.0	20.0	10.0	75.0
Midwest	83.3	58.3	16.7	16.7	0.0	16.7
Totals	40.2	23.8	9.2	20.5	10.6	35.4

SOURCE: Guarino, Brewer, and Hove 2000. Analysis of Data from the National Association of State Directors of Teacher Education and Certification.

[1]Not all states are represented in the data and there are differences in response rates across years, so changes over time should be interpreted with caution.

eral policy has evolved, it appears increasingly important to attract new vocational teachers who can support students' academic learning. However, recent data on the PRAXIS—a series of tests administered by the Educational Testing Service and required for state teacher licensure in 31 states[33]—indicate that candidates for vocational teaching jobs consistently score lower in reading, writing (not shown), and mathematics than candidates for other secondary subjects (Figure 2.8).[34] In reading and writing, in fact, prospective secondary vocational teachers have lower scores than those planning to teach at the elementary school level. Compared to other secondary teachers, vocational teacher candidates also have lower undergraduate GPAs and lower pass rates on the basic skill PRAXIS assessments based on the score their states set (Cramer forthcoming).

Case studies suggest that these assessments probably do not include individuals entering the profession laterally from industry (Stasz and Bodilly forthcoming).

[33]See http://ets.org/praxis/index.html.

[34]It is important to note that "other secondary" teacher candidates include those intending to teach math or English and language arts, who might be expected to have stronger skills in those subjects than teachers intending to teach other types of secondary courses including vocational classes.

Figure 2.8
Average PRAXIS I Test Scores, by Type of Teacher Candidate: 1994–1999

SOURCE: Cramer forthcoming. Analysis of PRAXIS Test Scores.
PPST = Paper-based Test CBT = Computer-based Test

Florida, Massachusetts, North Carolina, and Ohio, for example, allow lateral entry on the condition that vocational teachers take additional course work in teaching methods during their probationary or provisional period. However, none of these states appear to require these teachers to qualify on the exams required for other teachers' certification. Whether new vocational teachers from industry have stronger or weaker reading, writing, and math skills than do those who have completed teacher preparation programs has never been tested. These results suggest that there may be substantial practical constraints to setting a "higher bar" for the academic skills of entering vocational teachers.

A high and increasing share of vocational teachers come through alternative certification routes, but there is no evidence to suggest how this affects students.

Past research has stressed the importance of teacher education training and a teaching certificate as indicators of quality, although that notion has been challenged (Goldhaber and Brewer 2000). This debate is particularly relevant for vocational education, where industry experience has long been presumed to be an equitable, if not better, tradeoff for more traditional credentials such as a college degree and certification.

Perhaps due to teacher shortages or the expansion of alternative entry routes, an increasing share of high school teachers were working without regular or standard certification over the last decade. In particular, new teachers were far more likely to enter high schools without certification in 2000 than in 1991 (Table 2.27). The proportion of both new vocational and new nonvocational teachers who were not certified about doubled during that period. Some evidence suggests that a higher share of new vocational teachers were drawn directly from industry, perhaps entering through alternative certification routes (Levesque forthcoming).

Table 2.27
Percentage of New High School Teachers without Teacher Certification, by Teaching Assignment: 1991 and 2000

Teaching Assignment and School Type	Percentage of New Teachers without Certification		Change between 1991 and 2000
	1991	2000	
All vocational	11.7	22.1	10.4
All nonvocational	7.8	17.9	10.1*

SOURCE: Levesque forthcoming. Analysis of the Schools and Staffing Surveys, 1991–2000.

*Differences were statistically significant at the 0.05 level.

NOTE: Calculations were performed on unrounded numbers.

There is currently little research to evaluate the relative or unique contributions of teacher certification and industry experience to vocational teaching. No rigorous evaluations have examined the relationship between the credentials of vocational teachers and the occupational and technical competencies of their students. One recent survey indicates that, compared to those with a baccalaureate or postbaccalaureate degree, new vocational teachers who have alternative certifications are less likely to feel confident about pedagogy but more likely to feel well-prepared in their vocational subject area. There were

no differences, however, between the two types of teachers in terms of their confidence in their classroom skills, ability to work with special populations, or plans to remain in teaching (Ruhland and Bremer 2002). A review of research on the importance of industry experience in predicting vocational teacher quality reports that "there is no reliable correlation between years of occupational experience or scores on occupational competency tests and such variables as teacher qualifications, satisfaction, or effectiveness" (Lynch 1998, p. 47).

The decline in standard forms of teacher certification and other factors may be signals of a vocational teacher shortage.

Some states and local communities report teacher shortages, often blaming the lack of vocational teacher training programs in state universities (Stasz and Bodilly forthcoming). Recent evidence suggests that the number of colleges and universities offering vocational teacher training programs has declined by about 10 percent over the last decade (Bruening et al. 2001), but the increase in teachers entering the profession through alternative certification routes suggests that preservice programs are not necessarily a constraint. However, national data do suggest a gap between the supply of and demand for vocational teachers (Levesque forthcoming):

- ***Growth in high school enrollments, combined with little change in vocational course taking among students, leads to an increased demand for vocational seats.*** The number of students in high school grew by 17.9 percent between 1991 and 2000, while the average number of vocational courses taken remained constant at approximately 4.0 credits per student. Together, these trends suggest that the total number of vocational courses taken by students increased during the decade.

- ***Schools absorbed some increased demand through more hiring and larger class sizes.*** During the last decade, the proportion of vocational teachers at retirement age remained steady while the proportion of new hires increased. These trends resulted in a substantial net gain of teachers into vocational classrooms: between 1991 and 2000, an estimated 55,000 new vocational teachers were added to the workforce. These new hires were concentrated in areas of increased student enrollment—computer science and health care, for example—while the number of new teachers in business, trade and industry, and industrial arts declined, which was also consistent with student enrollment.

  At the same time, vocational class sizes, which had declined in the late 1980s, began to increase in 1991 following a pattern similar to that of academic high school classes (Table 2.28). During the 1990s, the average size of a vocational class increased

Table 2.28
Average Class Size for High School Teachers, by Teaching Assignment and School Type: Selected Years 1991–2000

Teaching Assignment and School Type	Average Class Size 1991	1994	2000	Change between 1991 and 2000
All vocational	18.1	18.9	20.5	2.4*
At comprehensive high school	18.2	19.1	20.6	2.4*
At vocational school[1]	15.7	15.9	18.8	3.1*
At other type of school[2]	16.9	17.8	19.3	2.4
All nonvocational	22.6	23.3	23.6	1.0*

SOURCE: Levesque forthcoming. Analysis of the Schools and Staffing Surveys, 1991–2000 and Levesque 2003d for 1991 and 1994 school types.

[1]Vocational schools include full-day vocational high schools and area or regional vocational centers that may serve students part day or part-time.

[2]"Other" schools include alternative schools and special schools serving students with disabilities.

*Differences were statistically significant at the 0.05 level.

NOTE: Calculations were performed on unrounded numbers.

by more than two students (18.1 to 20.5) but, in 2000, vocational classes still contained fewer students than academic classes by about four students (20.5 compared to 23.6). The average number of classes taught by vocational teachers (about five) did not change measurably.

- ***More schools report that vacancies are difficult to fill.*** The proportion of high schools seeking vocational teachers remained the same between 1991 and 2000 (at about one-third), while the share of schools with vacancies for academic teachers and special education teachers increased substantially. Schools reported growing difficulty filling vacancies in all subjects, but the proportion that found it very difficult or impossible to fill vocational teacher vacancies more than doubled, similar only to the increase for math and special education vacancies (Table 2.29). By 2000, one out of 15 schools did not fill their vocational teacher vacancies, one possible signal of teacher shortages. Another indicator of excess demand was that average salaries (adjusted for inflation) increased more for vocational teachers than for academic teachers (Levesque forthcoming).

Table 2.29
Percentage of High Schools Reporting It Was Very Difficult or Impossible to Fill Teacher Vacancies, by Teaching Field: 1991 and 2000

Teaching Field	Percentage of Schools 1991	Percentage of Schools 2000	Change between 1991 and 2000
Vocational	18.1	40.3	22.2*
Computer science	n/a	34.6	n/a
English/language arts	5.0	9.2	4.1*
Math	12.9	43.3	30.4*
Biology or life sciences	15.2	29.9	14.6*
Special education	26.9	40.9	14.0*

SOURCE: Levesque forthcoming. Analysis of the Schools and Staffing Surveys, 1991–2000.

n/a = not available or missing data.

*Differences were statistically significant at the 0.05 level.

NOTE: Calculations were performed on unrounded numbers.

Vocational teachers receive professional development on topics consistent with federal policy, most of it provided by state agencies with Perkins funds.

Professional development remains an important strategy to improve vocational education. According to case studies, teachers indicate that state agencies rather than districts or schools are the main providers of training. Such an emphasis is not surprising, given that professional development is a required state activity under Perkins III, and nationally states report spending approximately one-quarter of all state leadership funds on these activities (White et al. forthcoming).

States support professional development through state conferences or state funding of specific vocational models (e.g., High Schools That Work, career academies). Many states also have programs that encourage teachers to participate in "externships" with industry. Massachusetts, for example, uses a unique strategy: as part of its local planning for Perkins funds, each district grantee is required to set aside 15 percent of its grant for professional development and other state funds provide for general professional development for each school. This effort allows the state's schools (particularly the regional vocational schools) a sizable and stable pool for vocational teacher training (Stasz and Bodilly forthcoming).

Consistent with the case study findings, national data suggest that the majority of vocational teachers participate in professional development and, in 2001, did so in a wide

range of topics promoted by Perkins III (Table 2.30). Some topics were particularly prominent, as noted earlier:

- ***Standards are an important theme for vocational teachers.*** Most vocational teachers received training in 2001 on both academic and vocational standards. In fact, according to the survey, on average, vocational teachers received almost as much training (8.7 hours) on academic standards as did academic teachers (9.6 hours), suggesting that some effort is being made to align vocational education with general school improvement. Still, the time spent on academic standards amount to just a little over one day of in-service activity during the year.

Table 2.30
Percentage of Teachers Reporting on and Average Hours Spent in Professional Development on Selected Topics: 2001

	Academic Teachers		Vocational Teachers	
Selected Topics	Percentage of Teachers	Average Hours for Participants	Percentage of Teachers	Average Hours for Participants
Academic curriculum standards or student performance standards	87.0	9.6	83.3**	8.7
Vocational curriculum standards or student performance standards	40.6	6.3	77.0**	10.5*
Specific content in teacher's subject area	70.5	11.6	75.6**	12.9
Incorporating academic content standards or performance standards into career-related classes	33.6	7.8	70.8**	8.5
Incorporating career-related activities into academic curriculum	37.7	6.2	52.2**	8.0*
Using technology or equipment specific to teacher's classes	79.2	8.7	81.4	11.0*
Working with students with special needs	38.4	7.8	40.9	7.8
Using student assessments	65.4	7.9	57.1**	8.1
Designing curriculum or instruction where students apply concepts to real-world problems	46.7	8.4	55.9**	9.3
Incorporating workplace competencies into teacher's subject area	31.5	8.0	51.9**	8.6

SOURCE: Stasz and Bodilly forthcoming. Analysis of High School Study: National Teacher Survey.

*Statistically different from academic teachers at the 0.001 level.
**Statistically different from academic teachers at the 0.05 level.

- ***Subject matter and technology training are common to both academic and vocational teachers.*** Despite the emphasis on academic reform, vocational and academic teachers receive professional development in their specific content areas at roughly comparable rates. Both sets of teachers are equally likely to participate in technology training, although the time spent in it by vocational teachers is longer.

- ***Integration remains a key focus of professional development.*** As discussed in an earlier section, much professional development activity is targeted at integrating academic and vocational education in all its various forms. For example, 70.8 percent of vocational teachers received just over a day of professional development on incorporating academic content into vocational curriculum. More than half (55.9 percent) of vocational teachers worked on designing instruction that uses real-world examples.

While vocational teachers appear to have access to a broad set of training options, case studies suggest that vocational counselors and administrators do not receive the same level of support (Stasz and Bodilly forthcoming).

The teaching practices of vocational and academic teachers differ.

Many of the improvement strategies in Perkins III and its predecessors have implications for vocational instruction. Such approaches as curriculum integration, use of technology, working with employers, and raising the technical rigor of vocational courses are likely to involve instructional practices that differ from those of academic teachers.

- ***Academic teachers are more likely to use traditional didactic instruction while vocational teachers are more likely to use hands-on activities.*** There is little question that academic and vocational teachers use different methods to deliver instruction (Table 2.31). Academic teachers are more likely to report having students listen to a lecture, write a paragraph, do homework, or take a test or quiz. In contrast, vocational teachers report that their students engage in more applied activities—working on extended projects, using applied curriculum, performing technology-related tasks, and engaging in career exploration activities. Also, vocational teachers differ in the types of instructional activities they use: those who teach in comprehensive high schools are more likely to include writing and test-taking in their instruction, while those in vocational schools are more likely to provide hands-on activities. Vocational teachers in the two settings are equally likely to lecture and to have students work in groups, however (Stasz and Bodilly forthcoming).

Table 2.31
Percentage of Teachers Reporting Student Instructional Activity Occurs Frequently, by Teaching Assignment: 2001

Student Instructional Activity	Percentage of Teachers Reporting Activity Occurs Frequently in Class[1]	
	Academic	Vocational
Listen to a lecture	69.6	57.8**
Write a paragraph or more	53.6	38.6**
Receive a homework assignment	86.2	33.9**
Take a test or quiz	55.6	38.9**
Use computers	19.5	54.5**
Use appropriate instruments, tools, or equipment	23.7	64.6**
Work in groups during class	57.9	64.4**
Work on extended projects (two or more days)	18.5	53.0**
Use commercially available "applied academics" curriculum materials (e.g., CORD, AIT)	2.9	11.4**
Discuss or explore careers	4.8	23.9**
Apply academic skills to tasks that might be found in a job or career	21.5	64.2**
Use the Internet to conduct research	10.6	24.6**
Receive instruction from a teacher via distance learning	1.6	2.6**
Go to a local college to use technology applicable to class	0.0	1.1**
Go to a local business to use technology applicable to class	0.0	5.1**

SOURCE: Stasz and Bodilly forthcoming. Analysis of High School Study: National Teacher Survey.

[1]"Frequently" = one to two times each week or almost daily.

**Statistically different from academic teachers at the 0.001 level.

NOTE: CORD = Center for Occupational Development; AIT = Agency for Instructional Technology.

The types of instructional approaches that vocational teachers favor may have changed over time. When comparing teacher practices reported in the NAVE's 2001 national teacher survey with those reported in a 1992 national survey conducted for the previous NAVE,[35] vocational teachers are currently less likely to lecture in

[35]In both surveys, teachers were asked to report on the first class of the day. However, the 1992 survey asked teachers to indicate whether they used particular instructional practices when the class last met, while the 2001 survey asked about the frequency of the activities during the school year.

class and more likely to use computers. Academic teachers also increased their use of computers over time, as well as their use of assessments and tests (Stasz and Bodilly forthcoming).

- ***Academic teachers give significantly more homework than do vocational teachers.*** Academic teachers are not only more likely to assign homework, but the homework is more extensive (2.9 hours) than that assigned by vocational teachers (1.4 hours). However, comparing the two NAVE teacher surveys suggest that more vocational teachers are assigning homework than they did in the past (Table 2.32).

D. Coordination with Other Reforms

Without question, the principal focus of recent education reforms has been on improving students' academic achievement and increasing their opportunities to attend college. Perkins III provides explicit instruction to grantees to coordinate with these reform efforts by "building on the efforts of States and localities to develop challenging academic standards . . ." (Section 2). In addition, Perkins accountability systems require states to help vocational students meet state-established academic proficiencies (Sections 113 and 122(c)(5)(B)).

Federal vocational policy now places priority on ensuring that students in vocational programs are academically well-prepared for success in both postsecondary education and the labor market. How vocational education fits into state and local academic improvement efforts, or influences those efforts, may well affect the viability of career preparation programs in the future.

Vocational officials and initiatives have taken the lead on some important aspects of high school reform.

Although the direct influence of Perkins is unclear, the key role that many state and local vocational administrators have played in promoting high school change is not. Several practices that are quite common in high schools across the country were spurred by the interest and efforts of vocational educators, concerned in part about the academic performance of students in vocational programs. These strategies include the following:

- ***Smaller learning communities.*** Evidence on the benefits of small schools has been growing for some time, as has interest in the idea of using careers as an organizing principle for clustering students in classes. Career academies are one example of these efforts, increasingly viewed as a high school reform model but one with a career preparation or vocational component (Kemple 2001).

- ***Flexible scheduling.*** The need for new scheduling arrangements was evident in early Tech-Prep efforts to increase the time available for vocational courses and the extent of "hands-on instruction" in both vocational and academic classes (Hershey, Owens, and Silverberg 1996). Block scheduling, in which the school day is divided into four 90-minute class periods rather than the typical seven 45-minute periods, is now used to some extent in nearly half of the public high schools in the country (Levesque forthcoming). It is also a key strategy of the High Schools That Work (HSTW) initiative to increase the amount of time available for learning by lengthening the time in classes and reducing the number of changes between them (Hoachlander, Alt, and Beltranena 2001).

- ***Linkages with postsecondary institutions and faculty.*** There is little doubt that the introduction of Tech-Prep stimulated major investments in the development of articulation agreements and ways of collaborating more generally with postsecondary institutions (Hershey et al. 1998). The Perkins Act remains the only federal legislation that supports these types of cooperative efforts between secondary and postsecondary institutions and their faculty.

- ***Eliminating the general education track.*** Reducing the availability of low-level academic courses that make up the general education curriculum had been a goal of early Tech-Prep advocates and remains a central component of the HSTW initiative. Spurred, in part, by HSTW leaders, state vocational officials, such as those in North Carolina and Maryland, have teamed with their academic counterparts to encourage more rigorous standards for high school graduation requirements.

All of these efforts were presumed to benefit students in vocational programs as well as those who pursued little vocational education.

So far, there are mixed views on whether and how vocational education should be responsible for students' academic competency.

Despite the support for school improvement efforts, coordination between academic and vocational education reforms depends largely on the initiative of those who will carry out the reforms. Although few vocational educators would argue that stronger academic skills are unnecessary in the labor market, some disagree about whose responsibility it is to ensure that students meet state academic standards (Stasz and Bodilly forthcoming).

- ***State vocational officials generally supportive.*** At the state level, most officials agree that, in order to succeed as adults, graduating students now need higher levels of language arts and math skills than they had in the past and that academic assessment is one strategy for encouraging those improvements. In fact, nationally, state directors of vocational education ranked the Perkins core performance indicator "attainment of challenging state-established academic standards" as of equal importance as "attainment of vocational and technical skill proficiencies" (White et al. forthcoming). However these same officials were concerned about finding the appropriate balance between academic and vocational instruction, both in students' overall course schedules and in individual vocational course content.

- ***Substantial concern about emphasis on academic improvement among local vocational educators.*** According to case studies, "by and large, the local sites' reactions to academic testing regimes were overwhelmingly negative, even in states where testing is voluntary" (Stasz and Bodilly forthcoming, p. 69). Some local vocational educators are concerned that rigorous academic standards and assessments will drive out students who have been academically unsuccessful, many of whom are well-served in vocational education. Others fear that expanding the academic content of vocational courses, a process beginning in many states, will reduce the intensity of technical training and therefore the benefits to employers. In addition, some states are considering further increases in academic graduation requirements; both state and local vocational officials expressed concern that these changes may limit the amount of time students have to take elective vocational courses.

Academic improvement policies are influencing vocational education in a variety of ways.

The accumulation of academic reforms over the last decade is clearly having an effect on vocational education. While opinions may differ about the benefits of some of these

outcomes, they are certainly consistent with the direction of federal vocational education policy even if not caused by it.

- ***Stronger emphasis on academics in vocational courses.*** Such changes are only beginning to take place at the local level, as described in an earlier section. However, the focus on academic standards in recent state vocational curriculum guidelines suggests there may be more change ahead.

- ***Vocational students held to same academic standards as other students.*** In the past, some states and districts had different graduation requirements for students in vocational programs, special education programs, and other education pathways including the college-prep track. Increasingly, however, state education reforms have sought to establish minimum requirements to which all students would be held; by 2001, most states required students in vocational programs to meet the same course and exit exam requirements as other students (Table 2.33). Although initially in some states with "high-stakes" exams (e.g., New York and Massachusetts) local educators lobbied for different test standards for vocational students (e.g., lower passing scores, smaller number of subjects tested, or performance-based vs. multiple-choice assessments), the states resisted these efforts to establish separate benchmarks.

- ***Opportunity to help with dropout prevention.*** States' use of high-stakes academic assessments have led to concern about students' dropping out of school (Chudowsky et al. 2002). Many vocational educators share those concerns as well as misgivings

about the effect the tests may have on vocational enrollments. Most vocational teachers feel that vocational education can contribute to school reform, in part, by keeping students engaged and interested in school (Stasz and Bodilly forthcoming), although empirical analyses are less conclusive about that contribution (see Section E).

- ***Reduced enrollments and technical content in vocational courses.*** Although aggregate national data through the year 2000 do not show measurable declines in vocational participation (see Section B), many vocational educators report more recent reductions in enrollments, particularly as high-stakes exams are being phased in (Stasz and Bodilly forthcoming). Some states or schools have implemented strategies to maintain these enrollments in the face of increased academic credit requirements; full-day area vocational centers in Ohio (called "joint vocational schools"), for example, increased the number of academic courses offered so that students could meet their graduation requirements.

Mechanisms for reporting vocational performance remain mostly separate from those relating to academic performance.

Perhaps left over from the Vocational Education Data System (VEDS) requirements in previous laws, most current vocational data collection systems have been developed independently of those that maintain academic outcomes. Still, state vocational officials have been largely successful in tapping into state academic assessment systems to meet Perkins III performance-reporting provisions. In fact, relatively few states (20 percent) reported in 2001 that obtaining data on the academic proficiencies of vocational students was very difficult (see Chapter 5). About half of the states say that ESEA Title I and Perkins programs use common data systems to at least some extent. At the same time, that leaves another half of states in which little or no coordination in data systems occurs at the local level (Table 2.34).

The incentives to integrate academic and vocational data systems are not particularly strong, however. Even in states with vocational assessment programs of some kind (e.g., North Carolina and Ohio), the vocational results are not included in state high school accountability systems. Nor are students in vocational programs a subgroup for academic assessment reporting on school report cards, although those who invest in vocational education (take at least 3.0 credits) make up almost half of the high school population. There remains potential for further streamlining of state data and reporting systems.

Table 2.34
Number of States Reporting Little Coordination between ESEA and Perkins Accountability Reporting: 2001

Possible Elements of Coordination between ESEA and Perkins	Number of States Reporting "None" or "Not Much" Coordination between ESEA and Perkins Reporting
Common definitions for participation	25
Common definitions for special populations	9
Common reporting forms	33
Common data systems	23
Jointly determined performance benchmarks	34

SOURCE: White et al. forthcoming. Analysis of National Survey of State Directors of Vocational Education, 2001.

E. Outcomes and Effects

Perhaps the most important issue for vocational education, and for federal policy, is how well students who participate fare in school and beyond. Analysis of this issue involves looking at two dimensions of vocational education: (1) the basic outcomes of participants and whether progress is being made over time and (2) the "value added" of vocational education, comparing those who participate to similar students who do not participate as a way of measuring what might have happened in the absence of vocational course taking and programs. The first type of analysis tracks the performance of vocational students, while the second type examines whether vocational education itself contributes to that performance. Although both analyses are important, the value-added assessments provide policymakers with a better indication of the effectiveness of the program (Table 2.35).[36]

In both cases, changing priorities at the secondary level and the many performance objectives called for in Perkins III require an examination of a broad set of outcomes and effects.[37] These include not only the traditional labor market outcomes associated with vocational education but also academic achievement, high school completion, and

[36]Value-added analysis is the most rigorous approach for estimating the effects of participating in vocational courses. A randomized controlled trial is the preferred approach, where students would be assigned by lottery to either participate in vocational courses or not to participate. However, schools cannot deny students entry into vocational courses so that evaluation method is not feasible. Randomized controlled trials (lotteries) have been used to evaluate two career-related specialty programs—career academies and career magnets. Results from these studies are included under the "value-added" heading.

[37]These objectives, as noted in Chapter 1, are contained in the stated purpose and accountability provisions of the law. They are examined here in the order in which the law calls for them.

Table 2.35
Value-Added Effects of Vocational Education on Student Outcomes: Summary of Recent Research Evidence

Outcome	Effect	Research Evidence
Academic achievement	0	Consistent
High school completion	0/+	Mixed
Postsecondary enrollment		
Short-run (about one year after high school graduation)	–/0	Mixed
Medium-run (seven years after high graduation)	0	One study
Postsecondary completion (seven years after high school graduation)	0	One study
Complete a four-year college degree (vs. associate degree or certificate)	–	One study
Short- and medium-run earnings	+	Consistent

SOURCE: Agodini forthcoming; Agodini and Deke forthcoming; Agodini, Deke, et al. forthcoming; Crain et al. 1999; Hoachlander et al. forthcoming; Kemple and Scott-Clayton 2004; Plank 2001.

+ = vocational education increases the outcome.
– = vocational education reduces the outcome.
0 = vocational education has no effect on outcome.

postsecondary enrollment. Unfortunately, it is difficult to examine either the progress on or contribution of vocational education to its most direct outcome—occupational or technical competency—because few good measures of those skills exist.

Finally, it is important to note that, although vocational education is comprised of several types of courses, most researchers examining the relationship between vocational education and key outcomes have focused on *occupational* education courses.[38] This emphasis reflects the fact that occupational courses represent the majority of all vocational course taking (on average, nearly three out of four credits earned in vocational education) and previous studies have suggested that they offer the greatest potential benefit, particularly in predicting employment and earnings (Boesel et al. 1994b).

[38]In addition to occupational courses, termed "specific labor market preparation," vocational education includes general labor market preparation and family and consumer sciences.

1. In-School Outcomes: Academic Achievement and High School Completion

With academic improvement increasingly the marker of a high school's success, policymakers have sought to ensure that students who participate in vocational education are not left behind. Perkins III accountability provisions, for example, require states to report and make progress on increasing the proportion of vocational students who meet state-established academic standards. Improvement strategies in Perkins III encourage vocational programs to integrate and support academic learning.

Vocational educators and their academic colleagues face challenges in meeting these goals, however. Historically, many of the occupational concentrators and other students who pursue vocational programs of study (i.e., take at least 3.0 credits of occupational education) have entered high school with lower levels of academic achievement than other students, although in at least some states that seems to be changing.[39] In part because of their relatively lower academic achievement, those who are inclined to become vocational students may be at higher risk for dropping out of high school than are other groups of students. Moreover, some fraction of students will choose to enroll in vocational programs because they view themselves as academically unsuccessful, are disinterested in academic subjects, or want to prepare for work right after high school rather than pursue postsecondary education. It therefore should not be surprising if the path some vocational students take through high school differs from that of other students.

Students in vocational programs are earning significantly more core academic credits than in the past, and the gap between them and other students is decreasing.

More than a decade of attention to school reform appears to have helped increase the academic course taking of all students, including those who participate in vocational education. Public high school graduates earned almost one additional core academic credit—in English or language arts, mathematics, science, or social studies—in 2000 than they did in 1990 (Table 2.36). This increase is equivalent to more than one full-year academic course.

Occupational concentrators increased their academic course taking even more than other students, perhaps because they had farther to go in meeting new graduation requirements. As a result, by 2000 the gap between occupational concentrators and non-concentrators in the number of academic credits earned had narrowed significantly, from 1.8 to

[39]Recent analysis suggests that the eighth- or ninth-grade test scores of students who become occupational concentrators in Texas and Florida are very similar to the scores of other high school students who do not become concentrators (Hoachlander et al. forthcoming).

Table 2.36
Number of Core Academic Credits Earned by High School Graduates and Percentage of Students Meeting the "New Basics": 1990 and 2000

Type of Students	1990	2000	Change
	Average Core Academic Credits Earned		
All high school graduates	13.6	14.9	+1.3*
Occupational concentrators	12.3	14.1	+1.9*
Non-concentrators	14.1	15.2	+1.1*
Gap between concentrators and non-concentrators (credits)	1.8	1.0	-0.8*
	Percentage of Students Meeting the "New Basics" Standard[1]		
All high school graduates	38.1	57.9	+19.8*
Occupational concentrators	18.5	51.1	+32.6*
Non-concentrators	45.7	60.3	+14.7*
Gap between concentrators and non-concentrators	27.1	9.2	-17.9*

SOURCE: Levesque 2003c. Analysis of National High School Transcripts.

[1]New Basics = Four years of English and three years each of math, science, and social studies.

*Statistically significant at the 0.05 level.

1.0 credits (the equivalent of a 44.4 percent decrease). Most of the remaining gap is due to differences in science course taking.

Other indicators of academic course taking also show substantial progress. In a 1996 book entitled *Teaching the New Basics Skills: Principles for Educating Children to Thrive in a Changing Economy*, Murnane and Levy argued for both more academic course taking and better development of such "soft skills" as communication and problem-solving. The core academic curriculum they proposed included four years of English and three years each of math, science, and social studies as a way to upgrade students' academic competencies and preparation for both college and work. This core curriculum has become known as the "New Basics," and it is increasingly the standard for graduation requirements toward which many states have moved. Not only has the proportion of occupational concentrators meeting this standard more than doubled (from 18.5 percent to 51.1 percent) between 1990 and 2000, but the gap between concentrators and non-concentrators in meeting these standards declined by two-thirds (Table 2.36).

Still, while the increase in meeting the "New Basics" course standard among concentrators has been quite significant, those concentrators who meet the standard represent a small proportion of the overall student population. Students who both concentrated in an occupational program and completed the "New Basics" curriculum (those who have been called "dual concentrators") represented only 13.3 percent of all high school graduates in 2000, up from 5.1 percent of graduates in 1990.[40]

Differences in the rigor of academic course taking are also narrowing but remain.

There has been some success not only in increasing the *number* of academic courses that vocational students take but, to a lesser degree, in narrowing the gap in the *types* of courses they take. During the 1990s, concentrators and other students became more alike in terms of the rigor of their course taking, particularly in their completion of such "gatekeeper" courses as algebra 1. However, at the end of the decade, occupational concentrators were still much less likely than non-concentrators to complete a more demanding college-prep curriculum or to take advanced math, advanced science, or high-level English course work (Table 2.37).

Table 2.37
Percentage of Occupational Concentrators and Non-concentrators Earning Credits in Rigorous Academic Courses: 2000

Course Taking	Occupational Concentrators	Non-concentrators
College-prep curriculum[1]	29.2	46.2*
Algebra 1	90.6	95.1*
Advanced math[2]	28.9	46.1*
Advanced science[3]	46.8	63.1*
High-level English/language arts[4]	19.9	29.5*

SOURCE: Levesque 2003a, 2003c. Analysis of National High School Transcripts.

[1]The "college-prep curriculum" 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 (see Levesque et al. 2000).

[2]"Advanced math" includes algebra 3, trigonometry, analytical geometry, linear algebra, probability, statistics, precalculus, introduction to analysis, and calculus.

[3]"Advanced science" includes chemistry 1 and 2 and physics 1 and 2.

[4]"High-level English or language arts" classes include at least some honors courses.

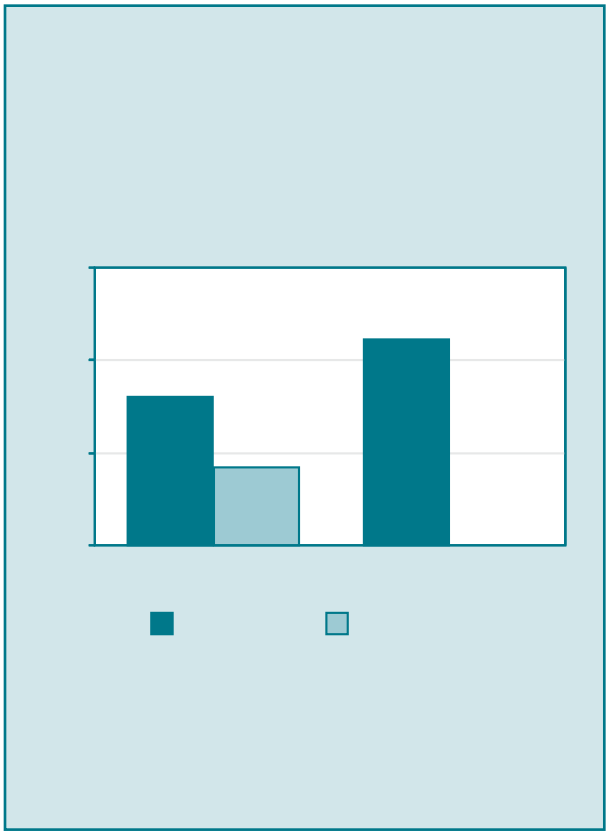
*Statistically significant at the 0.05 level.

[40]In 2000, occupational concentrators represented 26.0 percent of all high school graduates and, according to Table 2.36, just over half (51.1 percent) of those students met the New Basics standard. The proportion of graduates who both concentrated and met the standards is therefore 13.3 percent (.260 * .511).

This disparity in the rigor of course taking raises some concern. Because many students who concentrate in vocational education begin high school with lower levels of academic achievement, if they then take less challenging academic courses, they may have difficulty passing state academic assessments required for graduation. This problem was evident in a few states, where some local educators sought a separate set of passing standards or what they viewed as more relevant tests for vocational students. The comparatively low rate at which vocational students complete a college-prep curriculum is also important to consider when looking at the future of vocational education, as more and more students are aspiring to earn baccalaureate degrees.

The achievement levels of vocational students improved substantially during the 1990s.

The increase in the number and rigor of academic courses taken by vocational students over time appears to have paid off.[41] Over the last decade, successive groups of students who pursued a vocational program of study—occupational concentrators—had higher reading and math skills than the concentrators who came before them. Perhaps because they had farther to go in raising levels of achievement, concentrators experienced bigger increases in test scores than did non-concentrators in the same periods (Figure 2.9).



With regard to math skills, the increases in test scores for concentrators from 1990 to 2000 significantly *reduced* the gap between them and other students. The average NAEP composite math score for concentrators was 11 scale points higher in 2000 than in 1990, while there was no increase during that period for non-concentrators (Figure 2.9). As a result, the gap between concentrators

[41]Another explanation for the improved achievement of 12th-grade concentrators over time may be that the groups of students who pursued vocational programs of study changed during the decade. As noted in Section B, vocational education appeared to be attracting relatively more academically talented students during the 1990s.

and non-concentrators narrowed from 20 scale points to only 9 scale points. The gap became smaller for students with varying characteristics, including both men and women, those from minority racial-ethnic groups and from schools with very high proportions of students eligible for free and reduced-price lunches (Levesque and Paret forthcoming).

The difference in reading achievement between concentrators and non-concentrators did not change significantly, in a statistical sense. Comparable NAEP reading scores are available only for 1994 and 1998.[42] Although the average NAEP composite reading score of occupational concentrators increased by more (8.0 scale points) than did the scores of non-concentrators (4.2 scale points), the reduction in the gap between concentrators and non-concentrators—from 15.7 points to 12.0 points—was not statistically significant. Vocational students in most of the special population groups experienced increases in their reading scores as well (Table 2.38).

The NAEP assessments indicate that there has been substantial progress, but more work is necessary to raise the achievement levels of all students, particularly those in vocational programs. Most importantly, significantly smaller shares of concentrators than other students are "proficient" in reading or math, as defined by their most recent NAEP test scores (Figure 2.10). In 1998, for example, only 29.3 percent of concentrators, compared to 44.8 percent of non-concentrators, scored at or above the "proficiency" level in 12th-grade reading. In math in 2000, the proportions achieving proficiency are much lower for both groups of students but the gap between them, though much smaller, is still large. If proficiency on the 12th-grade NAEP assessments is associated with readiness for post-secondary education or success in the labor market, then these figures suggest a greater focus on academic improvement is needed.

But, on average, vocational courses as currently structured do not appear to contribute to an increase in students' academic achievement.

Despite the marked improvement in the academic course taking and reading achievement of successive groups of vocational students, the best available data suggest that, on average, these gains have been made without the help of vocational courses and programs. Analyses of high school student assessments in both the early and late 1990s indicate that vocational courses did not generally contribute or "add value" to students' academic achievement.[43]

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[42]Although a NAEP reading assessment was also administered in 1990, the nature of the assessment changed substantially between 1990 and 1994 so that scores cannot be reliably compared.

[43]Some advocates suggest that vocational education is not intended to affect academic achievement; on the other hand, the National Association of State Directors of Career and Technical Education highlight in their mission statement that vocational education is "an integral component of the total education mission, contributing to the goals of high academic achievement. . ." (see National Association of State Directors of Career and Technical Education undated, p. 3).

Table 2.38

Change between 1994 and 1998 in NAEP Reading Scores for Occupational Concentrators and Non-concentrators, by Student Characteristics

Student Characteristics	Change in NAEP Composite Reading Score (Scale Points) between 1994 and 1998		Gap in Average NAEP Composite Reading Score between Concentrators and Non-concentrators	
	Vocational Concentrators	Non-concentrators	1994	1998
All	8.0*	4.2*	15.7*	12.0*
Gender				
Male	9.6*	3.4	14.3*	8.2*
Female	7.0*	4.2*	15.5*	12.8*
Race or ethnicity				
White	6.9*	4.2*	18.0*	15.3*
African American	11.9*	9.0*	6.5*	3.6
Hispanic	12.7*	1.9	10.5*	-0.4
Asian	21.1*	9.8*	17.0*	5.7
American Indian	—	—	—	—
Other	—	—	—	—
Disability status				
Has disability	—	2.1	1.9	—
None indicated	7.8*	3.9*	14.7*	10.9*
English proficiency				
Limited (LEP)	—	9.5	—	—
Proficient	7.8*	4.3*	16.0*	12.6*
Percentage of students eligible for free or reduced-price lunches	7.4	4.4	19.0*	16.1*
10% or less	3.1	4.6	14.8*	16.3*
11–25%	12.2*	5.2	12.4*	5.3
26–50%	6.1	0.3	8.8*	3.0
More than 50%				

SOURCE: Levesque and Paret forthcoming. Analysis of 12th-Grade NAEP Reading Scores, 1994 and 1998.

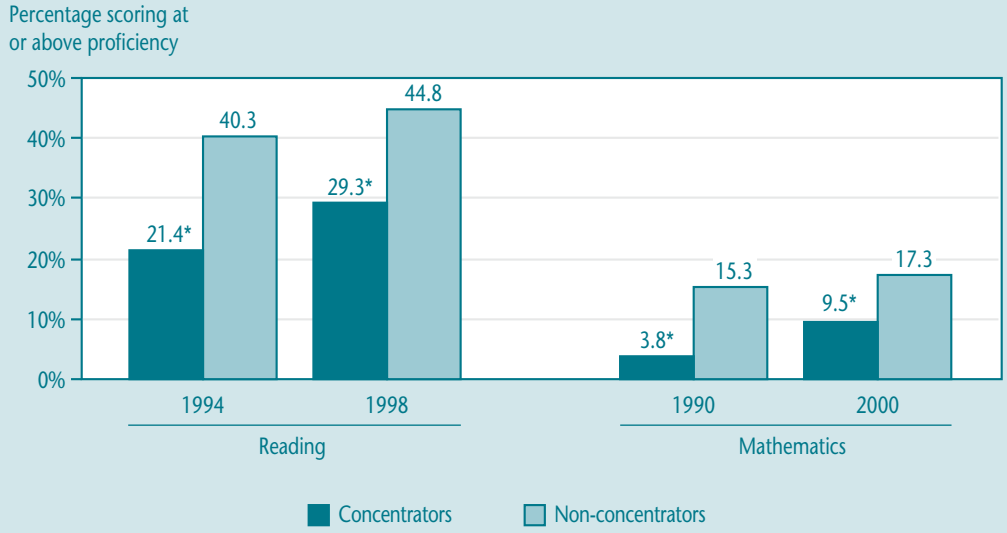
— = sample too small to compute mean.

LEP = Limited English Proficient.

*Changes over time and gaps were statistically significant at the 0.05 level.

Figure 2.10

Percentage of Concentrators and Non-concentrators Scoring at or above Proficiency on NAEP 12th-Grade Test Scores: Reading 1994–1998 and Mathematics 1990–2000



SOURCE: Levesque and Paret forthcoming. Analysis of 12th-Grade NAEP Assessments.

*Difference between concentrators and non-concentrators is statistically significant at the 0.05 level.
NOTE: All increases over time are statistically significant at the 0.05 level except for non-concentrators in mathematics (1990–2000).

- ***Completing a vocational program in the early 1990s produced achievement gains similar to those of completing a general education program.*** Studies using the National Education Longitudinal Study (NELS) database of 1992 high school graduates suggest that, after adjusting for demographic characteristics and prior academic achievement, students who pursued an occupational concentration did no better in reading, math, and science achievement between 8th and 12th grade than students who were in the general education program (Plank 2001; Agodini forthcoming).[44] However, compared with students who pursued a program with a high number of academic credits and little occupational education, concentrators had significantly lower achievement gains in high school. The studies also found that students who pursued both an occupational concentration and a high academic credit curriculum

[44]Both studies separated occupational concentrators who also pursued a strong academic program ("dual concentrators") from concentrators who did not meet those academic requirements. The studies concluded that dual concentrators experienced higher achievement gains than did general education students, while the occupational concentrators only experienced lower gains. Combining both groups of occupational concentrators produces gains that are similar to those of general education students.

experienced achievement gains in high school that were only slightly lower than those of students who only pursued a high academic curriculum (Table 2.39).[45]

Table 2.39
Difference in Adjusted 12th-Grade Test Scores[1] between Students Taking a High Academic Credit Program and Students in Other Programs of Study: 1992 Seniors

	Compared to Academic Program of Study, Test Score Difference in:		
Students' Program of Study	Math	Science	Reading
Occupational concentration plus strong academic program	-0.9	-0.6	-0.6
Occupational concentrator	-5.7	-2.0	-3.0
General education	-3.8	-1.4	-1.6

SOURCE: Plank 2001. Analysis of the National Education Longitudinal Study (NELS).

[1]Test scores have been adjusted to account for differences in students' 8th-grade test scores, race and ethnicity, and socioeconomic status.

NOTE: All adjusted scores are statistically different from those of students in the high academic credit program and different from each other at the 0.05 level.

- ***Participating in a career academies (vocational) program in the late 1990s had no impact on test scores.*** Career academies are a strategy to integrate the best of career preparation courses and college preparatory academics and were therefore thought to have the best chances of producing strong academic and labor market impacts. However, a recent randomized controlled evaluation of selected career academies updates the NELS findings for a group of students who were scheduled to graduate from high school in 1997 or 1998. According to the study, the main difference in the curriculum of students randomly assigned to the career academy and those assigned to their regular high school program was that the career academy students earned significantly more vocational credits. However, when comparing gains in 8th- to 12th-grade academic test scores, there were no differences between the academy participants and those assigned to the nonacademy control group (Kemple 2001).[46] While some part of the academy "treatment" extended beyond the vocational course taking, this rigorous evaluation does not provide support for the view that vocational courses help improve academic achievement. Similarly, an earlier randomized controlled study of high school career magnet programs in New

[45]The academic "program" or concentration is defined as one in which a student completed at least the "New Basics" curriculum: four years of English or language arts and three years each of math, science, and social studies.

[46]The evaluation also statistically controlled for student characteristics to account for any differences that remained between the treatment and control groups.

York City found that participating in these programs had no impact on reading scores and had a negative impact on math test scores (Crain et al. 1999).

- ***Individual vocational courses have no effect on academic achievement.*** Students who participate in various high school programs of study differ by more than their vocational course taking. Agodini (forthcoming) isolated the achievement effects of individual vocational courses—holding academic course taking constant—and found that, on average, taking an additional vocational course (occupational, general labor market preparation, or family and consumer sciences) neither contributes to nor weakens academic achievement. However, substituting academic courses for vocational courses would increase academic achievement.

- ***Participation in vocational education did not affect the achievement of special populations or other subgroups.*** Students who were educationally disadvantaged (defined by having low 8th-grade achievement or not having plans to attend college), in urban or rural schools, disabled, or from racial or ethnic minority groups received neither a benefit nor a loss in terms of math, science, or reading achievement from completing a vocational program or taking additional vocational individual courses.

- ***Preliminary analyses suggest that participation in a CTSO is not associated with improved academic achievement.*** The full range of activities that career and technical student organizations offer could affect academic achievement as well as other outcomes, but no studies have previously addressed these questions in a rigorous manner. Analysis of 1992 graduates suggests that participating in a CTSO either has no relationship to academic achievement gains or decreases them (Agodini forthcoming). One hypothesis for these outcomes may be that participation in CTSO activities, some of which are held after school, leaves less time for students to do their homework. However, because the available measure of student participation is a rather weak one, further investigation is needed.

These newer findings about the effects of vocational courses or programs on academic achievement are consistent with the results of previous studies. For example, the authors of the 1994 NAVE report (Boesel et al. 1994b) came to the same conclusion, drawing on a review of the earlier literature on this subject and earlier studies of the NELS data. As was true in the Agodini analyses, the earlier studies concluded that students give up academic achievement gains by taking vocational courses instead of academic courses, although the studies differ in the magnitude of the effects. Other efforts to track the academic outcomes of vocational students, such as those published by the HSTW network, provide important information on the progress of students in those schools but cannot be used to isolate how vocational courses themselves contribute to academic achievement.

There is mixed evidence that participation in vocational education reduces a student's likelihood of dropping out of high school.

Vocational educators have long advocated occupational courses as an effective strategy for keeping in school students who are at risk of dropping out. Studies of vocationally oriented programs in the 1970s and 1980s appeared to support this claim (e.g., Wonacott 2002), but because most of these studies have substantial methodological limitations, one cannot draw conclusions about the findings with confidence. More recent studies of vocational course taking provide mixed results, and the more rigorous analyses do not support the compelling anecdotal evidence.

Two studies of students who were scheduled to graduate in 1992 suggest positive effects for vocational education. The first (Rasinski and Pedlow 1994) concludes that taking vocational courses in 9th or 10th grade reduces students' probability of dropping out later in high school, largely because students earn higher grades in vocational courses, which in turn raises their class rank and self-esteem and makes them less likely to leave school.[47] Another analysis (Plank 2001) finds that, up to a point, the higher the ratio of vocational to academic courses students take, the lower is their probability of dropping out of school. The lowest probability occurs when students take three vocational courses for every four academic courses, a ratio difficult to achieve under current academic graduation requirements in most states. The study indicates that students most at risk—those with low levels of 8th-grade academic achievement and low grades—benefit most from vocational education. Both studies combined all forms of vocational education in their analyses—specific labor market preparation (occupational education), general labor market preparation, and family and consumer sciences.

However, three studies conclude that vocational programs have no effect, or perhaps even a negative effect, on dropping out of high school. A recent examination of the 1992 graduates uses a more comprehensive statistical methodology—but focused only on occupational courses—and controls for characteristics known to be predictors of dropping out, such as having a sibling who has dropped out and living in a single-parent family (Agodini and Deke forthcoming). The analysis finds that occupational course taking has neither a positive nor negative effect on high school completion and explicitly tests what happens when students combine three occupational courses for every four academic courses—a critical point according to an earlier study—and finds no effect. According to the results of this analysis, vocational course taking does not reduce or increase the likelihood of dropping out, even for students who enter high school with low levels of

[47]This approach has two drawbacks: it does not include students who drop out in 9th or 10th grade, and it does not examine the effect of course taking in 11th and 12th grades, when much of vocational course taking occurs.

academic achievement, who do not plan to go to college, or who attend schools with high concentrations of poverty.

Perhaps more importantly, the two most rigorous evaluations conducted—one of career academies and the other of career magnet programs in New York City—did not find that these vocationally oriented programs reduce dropout rates. The first finds that participation in career academies has no impact on high school graduation, even among at-risk students (Kemple and Scott-Clayton 2004).[48] The second study shows that participation in career magnet programs actually negatively affected (i.e., reduced the rate of) graduating on time (Crain et al. 1999). These two studies must be given greater weight, because the methodology of using a randomized controlled trial (a lottery) to create the participant group and a control group of nonparticipants is the only way to eliminate any bias in results from comparing groups.

2. Postsecondary Education and Training

Obtaining a postsecondary education credential remains an important goal for students and a longstanding objective of federal education investments. By almost any measure, the rate at which high school students participate in postsecondary education has been increasing over the last decade (Snyder et al. 1999),[49] as has the proportion of students who want to attend college—at either a two- or four-year institution (Ferris State University 2002). As a result, the group toward which vocational policy has historically been directed—the "noncollege bound"—is getting smaller. Still, at least a third of high school graduates either never enrolls or fails to complete a postsecondary program and earn a credential (Table 2.40).[50]

These trends are acknowledged to some extent in the Perkins Act. The law's performance indicators include enrollment in, retention in, and completion of postsecondary education and training as measures of vocational program success. Although the law stipulates that vocational education prepare students only for occupations that require a sub-baccalaureate degree, as will be clear, a substantial share of occupational concentrators

[48]The evaluation of career academies did find, however, that the program seemed to keep students in school longer even if that persistence did not pay off in terms of earning a diploma or a General Education Development (GED) credential (Kemple 2001).

[49]According to the *Digest of Education Statistics 1998* (Snyder et al. 1999), college enrollment rates of high school graduates increased from 59.9 percent in 1990 to 65.6 percent in 1998 (Table 186, p. 214). Enrollments in institutions of higher education as a share of 18- to 24-year-olds increased from 32.1 to 36.5 percent, and as a share of high school graduates increased from 37.7 to 45.2 percent (Table 189, p. 216).

[50]Eight years after high school graduation, 53 percent of concentrators and 66 percent of non-concentrators (64 percent overall) had earned a postsecondary degree or certificate; more than one-third of all high school graduates had not earned any postsecondary credential (Table 2.40 and Agodini, Uhl, and Novak 2002).

Table 2.40

Percentage of Short- and Medium-Run Postsecondary Education Outcomes for Various Samples of High School Graduates: 1992 and 1998

Postsecondary Education Outcomes	1992 Graduates (National)		1998 Graduates (Florida)	
	Concen-trators	Non-concen-trators	Concen-trators	Non-concen-trators
Ever enrolled in any postsecondary education or training				
About one year after high school graduation	60.1	82.6	58.4	57.0
Eight years after high school graduation	75.2	91.4	n/a	n/a
Among those enrolled in 18 months, type of first institution:				
Two-year or less	51.7	31.0	54.8	46.9
Four-year	48.3	69.0	45.2	53.1
Among those enrolled, completed any degree within eight years	53.4	66.2	n/a	n/a
With major related to high school occupational program	12.0	n/a	n/a	n/a
Among completers, highest degree earned				
Certificate	27.1	11.5		
Associate	27.1	13.9		
Bachelor	42.7	67.0	n/a	n/a
Graduate	4.1	9.6	n/a	n/a

SOURCE: Agodini, Uhl, and Novak 2002. Analysis of the National Education Longitudinal Study (NELS); Hoachlander et al. forthcoming. Analysis of Florida State Data.

n/a = not available or missing data.

(researchers' proxy for vocational "program completers") attend institutions that grant baccalaureate degrees. Therefore, the relationship between vocational education and a variety of postsecondary educational outcomes is examined.[51]

[51]For the most part, the impact of vocational education on these postsecondary outcomes cannot be measured using the most rigorous analytic methods—randomized controlled trials. Only one study, of career academies, used that technique to examine college enrollment, persistence, and completion. The alternative methods used in most of the vocational course taking analyses cannot account for all types of bias in who does and does not select to participate in vocational education. That is, some students may choose to take vocational education in high school because they do not plan to pursue postsecondary education or because they want to earn a technical associate's degree rather than a baccalaureate degree. So it is possible that the estimated relationship between vocational education and postsecondary outcomes may include some selection bias. Although the Agodini analyses control for students' college aspirations and plans, they may not fully eliminate this bias and therefore the findings should be interpreted with caution.

Postsecondary enrollment rates have grown faster for occupational concentrators than for other students.

The best available national data—unfortunately, not particularly current—suggest that a much higher share of vocational students in the 1990s entered college and postsecondary training activities than did in the 1980s. Although enrollment rates have risen for almost all students, they have grown at the fastest rate for those who had the farthest to go: while only 41.5 percent of occupational concentrators in 1982 enrolled within two years of high school graduation, a decade later, enrollment for that group rose to 54.7 percent (Table 2.41). Concentrators still have the lowest enrollment rates, however, perhaps reflecting that some who participate in high school vocational education do so because they plan to work rather than continue their schooling after graduation. Students' characteristics and motivation, not just their high school program, play a role in determining the paths they take.

Table 2.41

Percentage of High School Graduates Who Enrolled in Postsecondary Education or Training within Two Years after Graduation, by Curriculum Path: 1982 and 1992

Curriculum Path	1982	1992	Percentage Change
All students	57.3	73.0	+27.4
Occupational concentrators	41.5	54.7	+31.8
College-prep	95.6	93.2	-2.5
Other/general	61.2	69.1	+12.9

SOURCE: Levesque et al. 2000. Analysis of the High School and Beyond Longitudinal Study (HS&B) and the National Education Longitudinal Study (NELS).

Taking vocational courses and programs probably has no effect on enrolling in postsecondary education over the longer run.

Although vocational education has long been stigmatized as being for the noncollege-bound (Stasz and Bodilly forthcoming), the evidence suggests that students and parents have less cause for concern that taking vocational education deters enrollment in postsecondary education. In the short run, there appears to be some negative relationship between vocational course taking and college going, but it dissipates over time: adjusting for student characteristics and early achievement, after eight years, students who took high school vocational courses catch up. These results hold when "college" attendance is viewed broadly, including enrollment in a program that awards any type of credential after high school.

- ***Vocational course taking may either have no effect on or reduce the probability of attending college in the short run.*** Conventional wisdom suggests that students who do not attend college within a few years of graduating high school often never enroll. However, perhaps because vocational students know they can earn more than other students when they leave high school (see below), many choose not to directly enroll in further education. Studies of students in both the early and late 1990s indicate that those who were concentrators or who took an extra high school occupational course might lower their chances of attending college or training within the first year and a half after graduation (Agodini, Deke, et al. forthcoming; Hoachlander et al. forthcoming; Plank 2001).[52] In addition, the randomized controlled study of career academies suggests that participating in that program has no impact on college enrollment in the first year after high school (Kemple 2001). Moreover, given a choice between taking one occupational credit versus one low-level math or science credit, an average student would increase the probability of enrolling from about 78 percent to almost 81 percent (an increase of 2.7 percentage points) if that student chooses the academic option (Agodini, Deke, et al. forthcoming). These findings suggest that increasing academic course taking—for example, by encouraging students to complete the "New Basics" curriculum—may well raise their transition rates into college.

- ***On average, taking vocational courses neither hurts nor improves students' chances of enrolling in postsecondary education in the medium-run.*** Over time, many students who participated in high school vocational courses and programs eventually do enroll in postsecondary education or training; however, they do so later than other students. The rigorous evaluation of career academies, for example, found that this program linking academic and career courses had no impact on education attainment, measured four years after scheduled high school graduation (Kemple and Scott-Clayton 2004).[53] Eight years after high school graduation, although the rates at which students "ever" enrolled in college are different—75 percent for vocational concentrators and 91 percent for other students (Table 2.40), the difference disappears when the characteristics of students and other predictors of attending college are taken into account to isolate the effects of taking occupational courses. Moreover, low-level academic courses and occupational courses both have a very small medium-term effect on the probability of "ever" enrolling in college (Agodini, Deke, et al. forthcoming).

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[52]Analysis of Texas data suggests that, when only students who attend college in-state are included, vocational education appears to increase the probability of attending college. However, a similar result with the Florida data disappeared when information on out-of-state college enrollment was obtained. It appears that students who take little vocational education are more likely to attend college out of state, biasing the results in favor of vocational education when those out-of-state students are not included in the analysis.

[53]However, career academies appeared to reduce enrollment in postsecondary education among students who entered the program at the highest risk of dropping out of school.

- ***Participating in high school vocational education does not reduce the probability of early "stopping out."*** Research suggests a relationship between intermittent postsecondary attendance (i.e., periodic "stopping out") and lower earnings (Scott and Bernhardt 1999). One hypothesis is that vocational students who do enter college would be more "directed" as a result of their high school career preparation and thus might be less likely to "stop out" of postsecondary education and training, but that does not appear to be the case. Moreover, substituting low-level academic courses for occupational ones in high school is associated with lower rates of stopping out of college in the first year and a half after enrolling (Agodini, Deke, et al. forthcoming). Again, this result may reflect the relatively higher opportunity cost (lost earnings) of staying in college for students who invested in vocational education in high school.

- ***Among concentrators, participating in a CTSO is not associated with higher postsecondary enrollment but may be related to higher completion rates.*** Many types of students participate in CTSOs, including those who take only one or two vocational courses. However, even when focusing only on "occupational concentrators" (those who earn at least 3.0 occupational credits in the same program area), both those who do and do not participate in CTSOs have the same rates of college transition, and regression analysis to adjust for student characteristics does not change these results. On the other hand, among students who did attend postsecondary institutions, concentrators who participated in a CTSO were more likely to earn a degree (62.2 percent) than concentrators who did not participate (50.3 percent). These findings must be interpreted with caution, however, because students who do and do not participate in a CTSO may differ on many other factors that could not be controlled for in these analyses (Agodini, Deke, et al. forthcoming).

- ***Vocational course taking affects students from special populations in much the same way as other students.*** Looking across studies, the results on short- and medium-term enrollment in postsecondary education generally hold true for educationally disadvantaged students (including LEP and migrant students and those with low achievement in 8th grade); economically disadvantaged students; students with disabilities; and both men and women (Agodini, Deke, et al. forthcoming; Hoachlander et al. forthcoming). The numbers of students from these groups in the data are too small to examine other postsecondary education effects.

Vocational education is associated with a shift from earning a baccalaureate degree to earning an associate's degree or certificate.

Although student aspirations for baccalaureate degrees are high, many in the vocational education community argue that completing a technical associate's degree or certificate is at least as valuable in the labor market and more so than spending a few years at a four-year institution without earning a credential. It is certainly true that projected demand for occupations requiring a vocational associate degree remain among the highest of job growth categories (see Chapter 1).

The evidence indicates that the more students invest in vocational education in high school the more likely they are, compared to other similar students, to complete a two-year or lesser degree instead of a baccalaureate degree (Agodini, Deke, et al. forthcoming). For the average student who enrolls in any type of postsecondary education within seven years of high school graduation, taking an additional occupational course in high school decreases the probability of earning a baccalaureate degree by 2 percentage points (from about 73 percent to 71 percent), and increases the probability of earning an associate degree or certificate by the same amount.[54] In contrast, taking additional low-level math or science courses raises students' chances of earning a baccalaureate degree, perhaps because doing so makes students more eligible for or more prepared to complete four-year degree programs.

3. Employment and Earnings

Vocational education has long been viewed as preparation for jobs and careers. As a result practitioners and researchers have judged its success primarily in terms of employment and earnings benefits, and often just for those who do not enroll in postsecondary education. Currently, however, many students who take vocational education courses in high school do go on to college, and a large share combine college and work. Students who do and do not participate in vocational education in high school complete their postsecondary programs at different rates and at different times. These different pathways, and the way they affect students' length of time in the labor market, make it challenging to estimate the effects of vocational education on earnings. Still, although Congress chose not to include earnings in the Perkins III accountability measures, for many it remains the most important long-term indicator of the effectiveness of vocational programs.

Earnings, however, are a function of both wages and the number of hours worked. On the one hand, the distinction between these two factors may not matter—higher earn-

[54]The net effect, then, is that occupational course taking has no overall impact on postsecondary degree completion.

ings, regardless of how they are obtained, are presumed to allow a higher quality of life. On the other hand, a higher wage is often viewed as reflecting a "better" job, while more hours worked means additional effort. In assessing the benefits of vocational education, higher earnings that result from higher wages rather than more hours worked are a more desirable outcome, although most data sets available for analysis cannot adequately separate these components.

Vocational education has little effect on employment.

A variety of studies confirm high employment rates for students in the 1990s, both immediately after high school graduation and later in life. More than 90 percent of 1992 graduates who pursued vocational, general education, and only academic programs of study worked during the first year and a half after graduating, and a similar proportion held jobs in 2000, eight years later (Agodini, Uhl, and Novak 2002).[55] The career academies evaluation found similar short-run results for 1997 and 1998 graduates (Kemple 2001). These high levels of employment provide little opportunity for students' high school program of study to affect whether they get jobs.

Vocational courses are associated with two other employment measures, although the magnitude of the results may be too small to be policy-relevant. For example, taking an additional occupational course appears to reduce the amount of time it takes students to get their first job by about two-and-a-half days; in other words, students would need to complete 12 more occupational courses (or half of the typical high school course load) to reduce the time it takes to get their first job by one month. Similarly, taking an additional occupational course is associated with a 1 percentage point increase in the percentage of months worked in the first year and a half after graduation.

Occupational courses and programs are associated with significant short-term earnings benefits for students overall.

While there is little consensus within the vocational education community about whether vocational education should contribute to academic achievement or college going, there is a strong belief that vocational courses and programs provide students with substantial earnings advantages. That belief is confirmed by analyses of both national and state data, for groups of high school graduates in the early and late 1990s, and particularly when considering earnings in the first year or so after high school graduation. For 1992 high school graduates, for example, taking an additional occupational course is associated with a 3.2 percent (or $207) increase in earnings in the year or so after graduation (Figure 2.11).[56]

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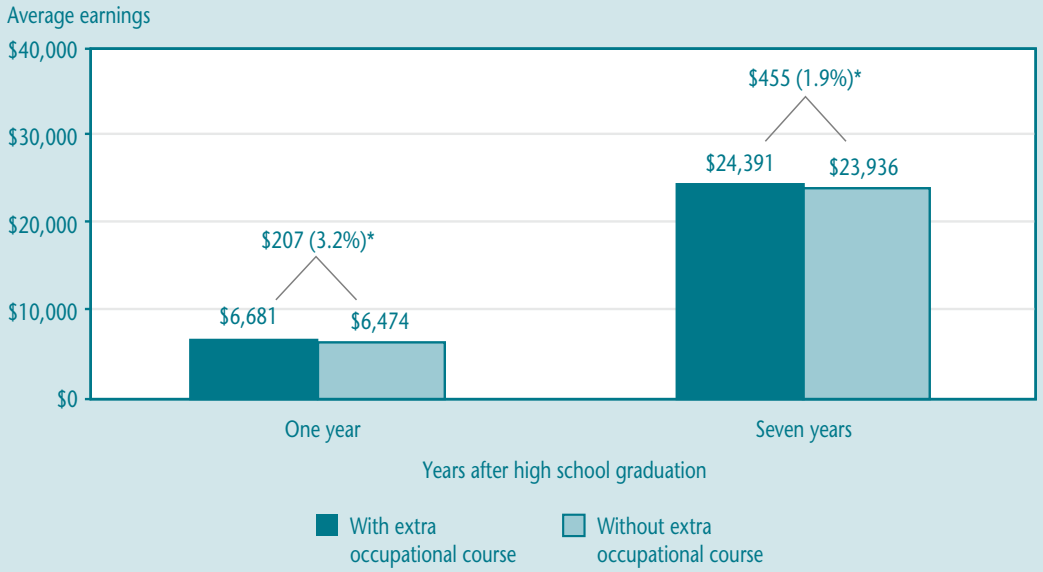
[55]In addition, the average number of hours worked (about 43 hours per week) in 2000 was also similar across groups (Agodini, Uhl, and Novak 2002).

[56]Studies use different follow-up periods to examine short-term earnings, but they are grouped here as representing approximately 1.5 years after graduation. Analyses of 1992 graduates (NELS:88) have approximately 20 months of earnings information. State data results are based on 15 months of earnings.

Figure 2.11
Average Earnings of 1992 High School Graduates, with and without an Extra Occupational Course: First Year and a Half and Seventh Year after Graduation



SOURCE: Agodini, Deke, et al. forthcoming. Analysis of NELS 1994 and 2000 Follow-up Surveys.
*Indicates that the effect is significantly different at the 0.05 level, two-tailed test.

- ***Taking high school vocational courses raises early earnings of college students who work.*** The evidence suggests that students who combine postsecondary education and employment in the first year or so after high school benefit from having taken vocational courses in high school: an extra occupational course increases their earnings by between 3 and 5 percent (Agodini, Deke, et al. forthcoming; Hoachlander et al. forthcoming).

- ***For students who do not attend college within a year or two after high school, the advantages of vocational education are uncertain.*** Students who go to work directly after high school instead of enrolling in postsecondary education are considered to face challenges in achieving long-term labor market success. Two recent studies suggest conflicting evidence about these students' short-term transitions. Hoachlander et al. (forthcoming) examined late 1990s high school graduates in two states and found that, among noncollege students, having taken an additional occupational course in high school increased their earnings in the year or so after graduation by between 2 and 8 percent. However, a study analyzing the national sample of 1992 high school graduates found no relationship between occupational courses (or other vocational courses) and earnings for students who do not enroll

in postsecondary education within two years after high school. Taking additional low-level academic courses in place of occupational courses also had no effect on earnings, although substituting advanced math for occupational courses would generate higher earnings. These mixed findings are consistent with the accumulation of earlier studies on the same subject, which generally found no earnings effects for noncollege students overall but some advantages for young women (particularly if they took courses in the health field) (Boesel et al. 1994b).[57]

- ***Students from special populations generally benefit from vocational education.*** Looking across studies, vocational course taking appears to contribute to short-term earnings for economically and educationally disadvantaged students, students with disabilities, and for both men and women.

- ***The relationship between specialization in a vocational program area and higher earnings is unclear.*** Studies examining the benefits of "concentrating" vocational course taking have produced mixed results. Analyses of data in two states for graduates in the late 1990s suggest that the economic benefits of vocational education are correlated with the degree to which students focus their occupational course taking in one field. That is, compared to similar students who took no or few courses, students who took at least 3.0 occupational credits and concentrated them in a single program area earned more than did similar students who took the same number of credits but took them across multiple program areas (Hoachlander et al. forthcoming). In contrast, an examination of national, but earlier, data on high school students indicate that there is no statistically significant difference in earning effects for students who take their 3.0 or more credits in a single occupational program area or across several different programs (Agodini, Deke, et al. forthcoming).

- ***Participation in co-op education is associated with higher short-run earnings.*** Co-op is a longstanding, for-credit work experience program in which about 16 percent of high school students participate nationally. Data from one state (Florida) indicate that involvement in these experiences provides an earnings advantage for students during the first year or so after high school (Hoachlander et al. forthcoming).

[57]Another recent paper (Mane 1998) did find earnings effects for students who did not enroll in postsecondary education in the short-run. However, that paper included in its "noncollege" group students who enrolled in college part-time or for a short period of time, an increasingly large share of postsecondary students. When those part-time students were excluded from the noncollege group, the benefits of high school occupational course taking disappeared (Agodini, Deke, et al. forthcoming).

The earnings advantage of high school vocational education still appears significant for some groups in the medium term, but the long-run effects are unclear.

Two recent studies suggest that secondary vocational courses and programs offer benefits that are sustained several years after high school. For example, the rigorous evaluation of career academy programs found that, for young men, participating in those programs had a significant impact on students' earnings four years after high school graduation; young men randomly assigned in high school to participate earned 18.3 percent more than did men randomly assigned to a control group who did not participate. There were no earnings impacts for young women, however (Kemple and Scott-Clayton 2004). Because career academy programs include a broad set of activities (e.g., job shadowing and internships), the impacts on earnings cannot be definitively attributed to the higher levels of vocational or career course taking among participants; that is one hypothesis, however.[58]

Vocational education courses are also associated with higher earnings for some students seven years after high school graduation, although the evidence is not as strong as it is for short-term earnings (Agodini, Deke, et al. forthcoming). As a proportion of current earnings, the benefits are smaller (1.9 percent per extra course) after seven years than they were just a year or so after graduation (3.2 percent per course). Still, that 1.9 percent translates into approximately $455 per additional occupational course, or a more than $1,350 earnings advantage for vocational concentrators over similar students who did not take 3.0 occupational credits (see Figure 2.11). However, unlike the short-run, substituting occupational courses for low-level academic courses in high school would have no effect on earnings; only high-level math courses would raise earnings by more than vocational courses. As was true for the effects on short-term earnings, however, these positive results do not hold for nearly one-quarter of high schools students who never enrolled in post-secondary education or training.

The analysis of the relationship between vocational education and medium-run earning also suggests:

- ***The benefits of vocational courses come from students' working more, although higher wages may also play a role.*** Estimating the separate effects of vocational education courses on wages and hours worked suggests that, overall, the earnings advantage comes from students' working more hours rather than obtaining a "better" job, as measured by their wages. Among individuals working seven years after graduation, taking an additional occupational course increased the number

[58]It is important to note, however, that the career academies who were the subject of the study involved employers more intensively and offered more extensive work-based learning opportunities than is typical in most high school vocational education programs.

of hours worked in a year by 25 hours; there was no effect on hourly wages for students overall. However, taking occupational courses in high school may be associated with higher wages for young men and for students who are economically disadvantaged (attend low-income schools) or educationally disadvantaged (entered high school with low levels of academic achievement) (Agodini, Deke, et al. forthcoming). Moreover, the career academies evaluation found that four years after graduation, young male participants earned higher wages ($9.75) than did the control group ($9.01) (Kemple and Scott-Clayton 2004). Thus, for some students, high school vocational course taking may lead to higher wage jobs.

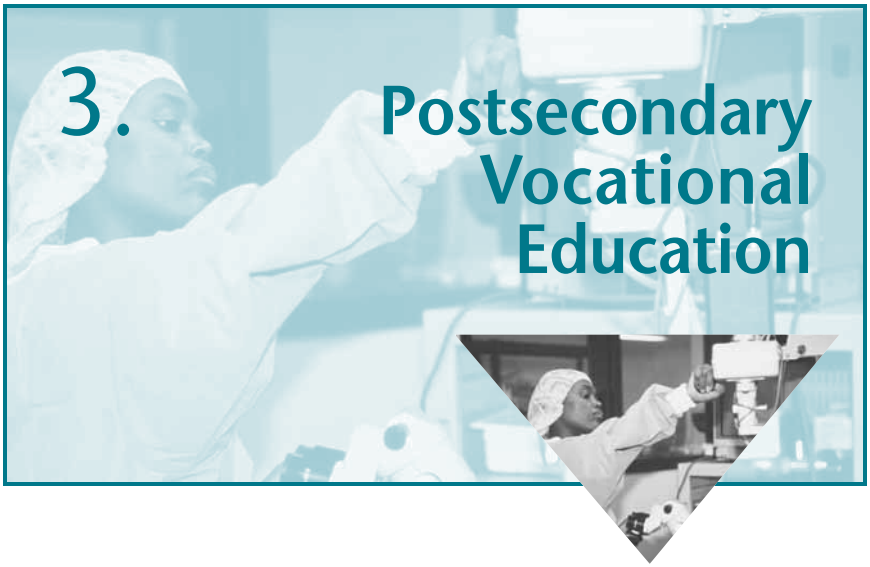
- ***Special populations receive similar benefits.*** The evidence suggests that vocational course taking increases medium-run earnings for students in some special population groups, as well as for students overall.

- ***Students who take an extensive academic core ("New Basics") curriculum earn more if they also take occupational courses.*** It is possible to complete both a solid core academic curriculum and an occupational concentration; as noted in an earlier section, 13.3 percent of all high school graduates do so. Among students who meet the "New Basics" standards—four years of English or language arts and three years each of math, science, and social studies—those who take an additional occupational course or who are occupational concentrators earn more than students who do not participate or participate very little in vocational education (Agodini, Deke, et al. forthcoming). Given that increased academic course taking raises postsecondary enrollment rates, at least in the short-run, while occupational course taking improves earnings, combining these two curriculum patterns may well produce the broadest range of benefits for high school students.

Whether the medium-run benefits of high school vocational course taking will persist over time is unclear. The earnings premium soon after high school graduation was 3.2 percent, but 1.9 percent seven years later. Moreover, medium-run estimates, a major contribution of the NAVE analysis, must be viewed in tandem with the postsecondary education results. First, to isolate the effects of vocational course taking in high school, multivariate analysis must control for not only the demographics and achievement of students but also their education pathways after graduation; using these methods, earnings are statistically compared for students who had similar characteristics and achievement in high school and who attained the same level of education after high school. Thus, the finding that vocational course taking is associated with reduced enrollment in four-year colleges is not taken into account in the earnings calculations—which the research literature suggests would decrease earnings in the long run.

Moreover, having only seven years of post-high school employment data precludes obtaining a complete picture of course-taking effects. Students who invested in vocational education in high school are likely to have completed less postsecondary education (see above) and therefore have been employed longer than other similar students, allowing them to accumulate earnings and valuable labor market experience. On the other hand, within the seven-year window of data, students who completed a baccalaureate degree or higher (i.e., those who were less likely to have taken high school vocational courses) have only just begun working full-time and have relatively little work experience. In other words, the power of their higher credentials on earnings has not been fully realized.

Most research indicates that, in the long run, each additional year of college produces an earnings premium, suggesting that high school course taking that encourages higher educational attainment may be most beneficial. Clearly, then, it is important to ensure that students are able to attend and succeed in postsecondary education, even if some students choose not to follow that path.



3. Postsecondary Vocational Education

Vocational education is offered at both the postsecondary and high school levels, but at each level the mission of the educational institutions that provide it and the objectives of the students who participate are quite different. In reauthorizing the Perkins Act, policymakers may therefore wish to consider (1) whether postsecondary vocational education is sufficiently distinct from secondary vocational education to warrant separate treatment in the legislation, and (2) if a new law should focus on particular problems in postsecondary vocational education (e.g., improving students' completion rates or easing their transitions from high school), or as is currently the case, allow grantees to decide. These issues are particularly important if postsecondary vocational education is to be better coordinated with the workforce development system, an outcome Congress promoted in Perkins III.

To help inform these overarching policy concerns, this chapter provides background on how postsecondary vocational education is organized (Section A) and addresses four main questions:

1. Who enrolls in postsecondary vocational education and what are their objectives? (Section B)
2. To what extent are the strategies promoted in Perkins III implemented at postsecondary institutions that provide vocational education? (Section C)
3. What role does postsecondary vocational education play in formulating state and local workforce development strategies? (Section D)
4. What are the economic benefits of participating in postsecondary vocational education? (Section E)

▶ Key Findings ◀

KEY FINDINGS

▶ ***Postsecondary vocational education provides economic benefits to most participants, with the minority who earn a credential reaping the greatest benefits.***

Important economic benefits are associated with participation in postsecondary vocational education. Even those who leave occupational programs without obtaining a degree or certificate earn between 5 and 8 percent more per year for each year they participate in postsecondary vocational education than do high school graduates with similar characteristics. However, credentials do matter. The benefits of completing a vocational associate degree are significantly higher: females who have such a degree earn nearly 47 percent more than females with a high school diploma, and their male counterparts earn 30 percent more. In addition, entry into fast-growing fields such as health care and information technology increasingly depends upon completing some type of credential—either a college degree or an industry-based certificate.

Despite the added economic advantage associated with earning a credential, less than half of all postsecondary vocational participants earn a credential of any kind—an institutional certificate or associate or baccalaureate degree. Most (68.3 percent) complete a year or less of course work. Although about half of the students appear to be seeking a certificate or degree, many others may not enroll with that objective in mind. Taking student goals and characteristics into account, the completion rate for vocational majors is similar to that of academic majors, although vocational participants are more likely to earn a shorter-term credential (e.g., certificate) than the one they originally sought.

▶ ***Postsecondary vocational education serves a large, diverse population with varied needs and objectives.***

The postsecondary vocational education enterprise is large, serving nearly one-third of all undergraduates and two-thirds of students enrolled at community and technical colleges who have declared a major. A significant proportion of these students are "economically disadvantaged" (21.2 percent are from households in which the annual family income is less than $20,000) or are "academically disadvantaged," while others have previously earned postsecondary credentials, most commonly certificates (30.4 percent). Nationally, about half enroll in postsecondary vocational

▶ ▶ ▶

education within a few years of graduating high school, while the other half are more than 23 years old. Given their diverse characteristics, it is no surprise that these students enroll with different objectives in mind. About half are specifically seeking a credential (certificate, associate degree, or a baccalaureate degree), while one-third say they enrolled to obtain job skills; the remainder participate for personal enrichment purposes. Understanding why students choose to enroll in postsecondary vocational education is crucial to determining what they subsequently accomplish and whether those outcomes are adequate.

► ***Some Perkins improvement strategies are consistent with vocational education practice in postsecondary institutions, but the extent to which Perkins "drives" these strategies is unclear.***

A number of improvement strategies promoted in both Perkins II and Perkins III—e.g., the involvement of employers, use of current technology, articulation agreements—are standard in many community and technical colleges. Other strategies, such as the integration of academic and vocational education, receive less emphasis. The prevalence of these practices, however, may be mostly related to how postsecondary institutions carry out their training missions. Several factors are likely to limit the impact of Perkins legislation on the implementation of postsecondary vocational education: (1) the small amount of Perkins funds received by any individual postsecondary institution (on average 2 percent of their yearly expenditures); (2) the perception that improvement strategies emphasized in Perkins III are based on the needs of high schools; and (3) the historic independence of postsecondary institutions, in some cases even from state agencies.

► ***Community and technical colleges had limited involvement in the early implementation of the Workforce Investment Act (WIA), citing low emphasis on training and reporting requirements as disincentives.***

In the early stages of WIA implementation—during a period of economic expansion and job growth—the emphasis was primarily on organization and the delivery of job information rather than the kinds of training activities Perkins-eligible institutions typically provide. For example, in 2000, nearly three-quarters of those who participated in the previous federal job training system (the Job Training Partnership Act) received training, while only one-third of WIA registrants did so. There is some evidence that, with the recent economic downturn, the proportion of training vouchers is increasing, as is policy interest in training. However, the lack of coordination—primarily at the state and local levels—between WIA and Perkins accountability measures still entails substantial costs for participating institutions.

A. Organization of Vocational Education at the Postsecondary Level

The Perkins Act primarily funds community and technical colleges, but the postsecondary vocational education enterprise as a whole includes many other providers—business, industry associations, unions, and for-profit schools. This broad group of institutions offers a wide range of postsecondary training opportunities including credit and noncredit courses offered in programs of varying length. Increasingly students also can decide whether they want to receive their instruction in conventional classroom settings or online. This diverse and evolving environment, though, presents challenges for federal policy.

The Perkins Act defines vocational education as programs preparing individuals for occupations requiring less than a baccalaureate degree (P.L. 105-332, Section 3(29)). Based on this definition, two key terms are most relevant for examining vocational education at the postsecondary level:

- ***All sub-baccalaureate:*** Refers to programs offered in less-than-four-year institutions or those that lead to less than a baccalaureate degree (including no degree) at a four-year institution. Sub-baccalaureate students are those who participate in these programs. Because of the stipulation in Perkins policy, this level of activity is the main focus of NAVE analysis.

- ***Sub-baccalaureate vocational students:*** Defined as sub-baccalaureate students by their major, according to the National Center for Education Statistics (NCES) classifications.[1]

Postsecondary vocational education consists of credit and noncredit courses offered at a variety of institutions.

Vocational education at the postsecondary level is a complex enterprise with many types of providers, only some of which are eligible to receive Perkins funding. Postsecondary vocational education includes for-credit programs leading to various credentials, in addition to single, noncredit courses to fulfill the diverse objectives of participants. Most providers, including those eligible for Perkins grants, offer a full array of these offerings

[1]Vocational fields include agriculture and natural resources; business, management, marketing, and support services; allied health professions, services, and health technicians; home economics and family and consumer sciences; personal services; legal support services; protective services; computer and information sciences; engineering and related technologies and science technologies; communications technologies; construction; mechanics and repair; precision production; and transportation and materials moving (Levesque et al. 2000).

and can determine which of the many choices to support with Perkins funds, including those that do not lead to a credential.[2]

- ***Perkins-funded institutions, especially community colleges, are the main providers of for-credit vocational programs, while institutions not eligible for Perkins grants are the main providers of noncredit courses.*** Based on student counts in 1999, 40.4 percent of those participating in for-credit vocational courses—those that could lead to a postsecondary credential—did so at a community college (Table 3.1). Fewer participated in for-credit courses at proprietary institutions (22.6 percent) or at any other type of postsecondary institution. In contrast, business or industry was the single most important provider of the noncredit, job-related classes, seminars, and training programs offered nationally (36.7 percent of participants took advantage of these offerings). Only a small share of job-related noncredit participants reported taking their courses at "formal" postsecondary education institutions, such as a four-year college or university (11.9 percent), a community college (4.3 percent), or a public two-year vocational or technical school (1.9 percent).

Table 3.1
Percentage Distribution of Adults Participating in For-credit and Noncredit Job-Related Courses,[1] by Type of Provider: 1999

Provider	Credit	Noncredit
Area vocational centers	0.9	4.3
Two-year community college	40.4	4.3
Public two-year vocational or technical school	13.5	1.9
Four-year college or university	5.2	11.9
Proprietary school	22.6	9.1
Adult learning center	2.2	1.3
Business or industry	5.2	36.7
Professional association or labor union	2.0	10.4
Government agency and public library	4.9	11.6
Community, religious, or other organization	3.1	8.6
Total	100.0	100.0

SOURCE: Bailey, Leinbach, et al. forthcoming. Analysis of the National Household Education Survey, 1999.

[1]According to the NCES taxonomy, "credit" courses and programs are defined as job-related if they are vocational.

[2]However, under Perkins III, grantees must use funds to support programs that consist of a sequence of courses and opportunities for competency-based learning. As a result, some offerings (e.g., single-course or limited leisure programs) cannot be funded with Perkins grants.

- ***Institutions that receive Perkins funds (primarily community colleges) predominantly serve vocational students through for-credit courses and programs.***[3] About two-thirds of students with a vocational emphasis at community colleges enroll in for-credit courses.[4] Noncredit offerings at these institutions, although significant, do not represent their primary business activity.

The following describes the vocational programs and courses usually offered by postsecondary vocational providers, including those that receive funds under the Perkins Act.

- ***Associate degree programs (terminal or transfer-up):*** Generally made up of both academic and vocational for-credit course work (totaling roughly 60 credits), these programs can take two or more years to complete, depending on how many credits students earn each semester.[5]

- ***Institutional certificate programs:*** Typically designed to upgrade job-related skills, these programs usually require about one year's worth of full-time instruction in for-credit courses (24–30 credits), and compared to associate degree programs, involve far less, if any, academic courses.[6] However, certificates can be of varied duration and can be earned for quite diverse activities.[7] They are distinct from the increasingly popular industry skill certificates described below.

- ***Industry skill certifications:*** Developed and recognized by industry, these certificates are designed to signal proficiencies and are awarded to students based on their demonstrating well-defined skills (often through a test). Although postsecondary institutions and other training providers offer preparation for these tests, self-study is also a frequent strategy. An industry association or employer group, not the training provider, grants the certificates.

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[3]State financing policies, which vary from state to state, may play a role in the extent of noncredit offerings at public postsecondary institutions. For example, in Arizona, the state does not pay individual institutions for noncredit courses, and perhaps as a result, for-credit enrollments are proportionally higher than in other states. In contrast, Texas reimburses its postsecondary institutions for enrollments in noncredit courses, and participation in these courses is relatively high. The prevalence of noncredit courses varies widely from institution to institution as well. In Florida "supplemental vocational courses"—noncredit courses for people seeking to enhance their job skills—are about 25 percent of a given institution's headcount (Teitelbaum 2001, descriptive information from Florida state data). In contrast, a community college in Michigan reports that noncredit courses are less than 10 percent of their course offerings and less than half of those are job-related (Jacobs 2001).

[4]NAVE internal analyses of NPSAS 2000.

[5]Descriptive information from Florida state data.

[6]Descriptive information from Florida state data.

[7]Examples range from a floral arranging program lasting only a few weeks to a two-year certificate program in airframe and power plant mechanics.

- ***Noncredit course work:*** Intended mostly to accommodate those seeking specific job-related skills—e.g., Introduction to Windows (three hours) and Real Estate License Exam Preparation (20 hours)—or personal enrichment activities—e.g., ceramics or aerobics. Like courses within certificate programs, noncredit courses are diverse in their content and contact time. These can be stand-alone courses or sequenced courses in a nondegree-granting program (sometimes similar or even indistinguishable from for-credit courses offered in vocational degree or certificate programs).[8] Under Perkins III, funds can be directed only at programs that consist of a sequence of courses and that include competency-based learning (Section 3(29); Sections 134 and 135); thus, single courses and most enrichment activities are technically no longer supported by federal grants.

It is important to distinguish between for-credit and noncredit offerings at Perkins-eligible institutions because Perkins policy appears to favor for-credit course work. First, postsecondary Perkins grants are allocated within states to postsecondary institutions based on a formula weighted toward the number of Pell grant (federal financial aid) recipients the institutions serve.[9] This provision has the effect of placing greater emphasis on institutions that promote degrees and credentials because Pell grants are available only to income-eligible students who pursue for-credit (degree-oriented) course work. Second, Perkins III accountability provisions include "completion of a postsecondary degree or credential" as a key measure of performance (P.L. 105-332, Section 113(b)). However, there is no explicit language in the law that prevents institutions from using Perkins funds to support noncredit vocational course work or participants, as long as participation is in a sequence of courses that meets the federal requirements (Sections 134 and 135). Thus, this chapter examines both credit and noncredit participation to some extent.

[8]Descriptive information from Florida state data.

[9]This provision was intended to promote equal access to vocational programs by providing relatively more financial support to institutions serving large numbers of economically disadvantaged students (as approximated by financial aid criteria). Under Section 132(b), the law permits the secretary of education to approve alternative formulas.

B. Access and Participation

An increasing number of occupations require education beyond high school, and, for many students, postsecondary vocational education provides an avenue to enter them. The most recent Bureau of Labor Statistics (BLS) projections indicate that occupations requiring a postsecondary vocational credential accounted for 29 percent of all jobs in 2000 but will represent 42 percent of the total job growth from 2000 to 2010 (Hecker 2001). The extent to which postsecondary vocational enrollments match labor market needs and include those who have historically faced barriers to employment success is of considerable policy interest.

1. Trends and Patterns of Enrollment

Although a majority of high school students aspire to earning bachelors' degrees (Sanderson et al. 1996), by some key measures, 6 out of 10 postsecondary students actually enroll in sub-baccalaureate programs including vocational ones.[10] About 3 in 10 undergraduates major in a vocational field at the sub-baccalaureate level.

Sub-baccalaureate vocational programs continue to be a significant part of postsecondary education and of community college enrollments.

In 2000, just under one-third of all postsecondary undergraduates in for-credit programs (Figure 3.1)—an estimated 4.9 million youths and adults[11]—were enrolled in sub-baccalaureate vocational education.

- ***All sub-baccalaureate students outnumber baccalaureate students.*** Among those pursuing for-credit course work, a higher proportion of students participate in sub-baccalaureate programs (58.3 percent, the combined total of students in vocational, academic, and undeclared sub-baccalaureate programs) than in baccalaureate programs (41.7 percent). If noncredit participants were included, then the share of all

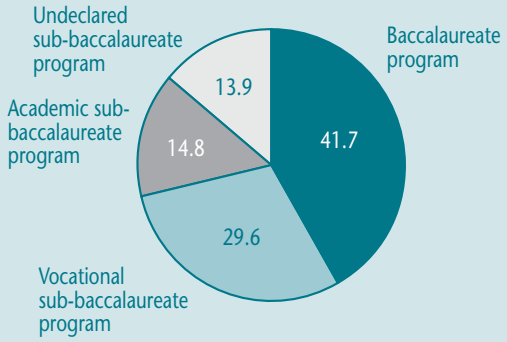
[10]National data on postsecondary enrollment are reported in different ways. Most commonly, the figures are based on fall enrollments provided by individual institutions of higher education (e.g., to NCES through the Integrated Postsecondary Education Data System (IPEDS)). However, limiting enrollment data to the fall greatly reduces the number of reported participants at the sub-baccalaureate level because many of these students enroll throughout the year. In addition, IPEDS enrollment data are reported by institution type (four-year and two-year). Because 13.5 percent of sub-baccalaureate programs are offered at four-year institutions, when aggregate IPEDS enrollment figures are reported just for two-year institutions, participation in sub-baccalaureate programs is underreported (Bailey, Leinbach, et al. forthcoming).

[11]Calculation based on 29.6 percent (see Figure 3.1) of the total number of undergraduates. The total number of undergraduates (16,539,461) enrolled in for-credit courses is estimated from NPSAS 2000 (e-mail communication with NCES project officer Andrew Malizio).

postsecondary students who are enrolled in sub-baccalaureate education would be even greater.

- ***At the sub-baccalaureate level, more students enroll in a vocational than in an academic major.*** Among sub-baccalaureate students, twice as many (50.8 percent) choose a vocational major as an academic major (25.4 percent). The remaining are "undeclared" (23.9 percent), a category that has been growing somewhat since the early 1990s (up from 18.0 percent in 1996) (Silverberg et al. 2002).

Figure 3.1
Percentage Distribution of Students, by Degree Level and Program Type: 2000



SOURCE: Bailey, Leinbach, et al. forthcoming. Analysis of the National Postsecondary Student Aid Study, 1999–2000.

Postsecondary vocational participants are more likely to enroll in associate degree programs than in institutional certificate programs.

Postsecondary institutions supported by Perkins grants traditionally have offered both associate degree and institutional certificate programs, each resulting in a different credential based on institutional and, in some cases, state requirements. Both credentials are conferred by higher education institutions and are included in the data collection efforts of NCES. Although the number of industry-developed certificates conferred has increased over time, they are not included in NCES collection efforts because educational institutions do not confer such credentials.

- ***Enrollment in associate degree programs far exceeds that of institutional certificate programs.*** Among students declaring a vocational major, two-thirds aim to obtain associate degrees, while only one-third intend to pursue institutional certificates. Although the proportion of vocational students seeking an institutional certificate appears to have grown between 1996 and 2000 (from 29.8 percent to 33.3 percent), the difference is not statistically significant (Bailey, Leinbach, et al. forthcoming; Silverberg et al. 2002).

- ***Although the number of industry-developed certificates conferred is growing, the role of Perkins-eligible institutions in this growth is unclear.*** Although NCES data do not provide information on certificates conferred by employers or by national industry, trade, and professional associations, the groups themselves report that the number of certificates offered and granted is increasing. For example, there was

nearly a tenfold increase in Microsoft Certified Systems Engineer (MCSE) certificates awarded between 1997 and 2000—from about 35,000 to more than 280,000. Much of this activity, however, may be taking place outside of Perkins-eligible postsecondary institutions.[12]

Enrollments in vocational associate degree programs appear to respond somewhat to shifts in the labor market.

The primary purpose of postsecondary vocational education is to prepare individuals to enter and succeed in specific occupations in the labor market. The ability of postsecondary institutions to offer up-to-date programs that respond to fluctuations in employment supply and demand is crucial to maintaining program quality. Of course, student demand—i.e., enrollments—is an important factor in the choices that institutions make. Therefore, examining the relationship between national labor market trends and patterns of enrollment in postsecondary vocational education provides a measure of that responsiveness.[13]

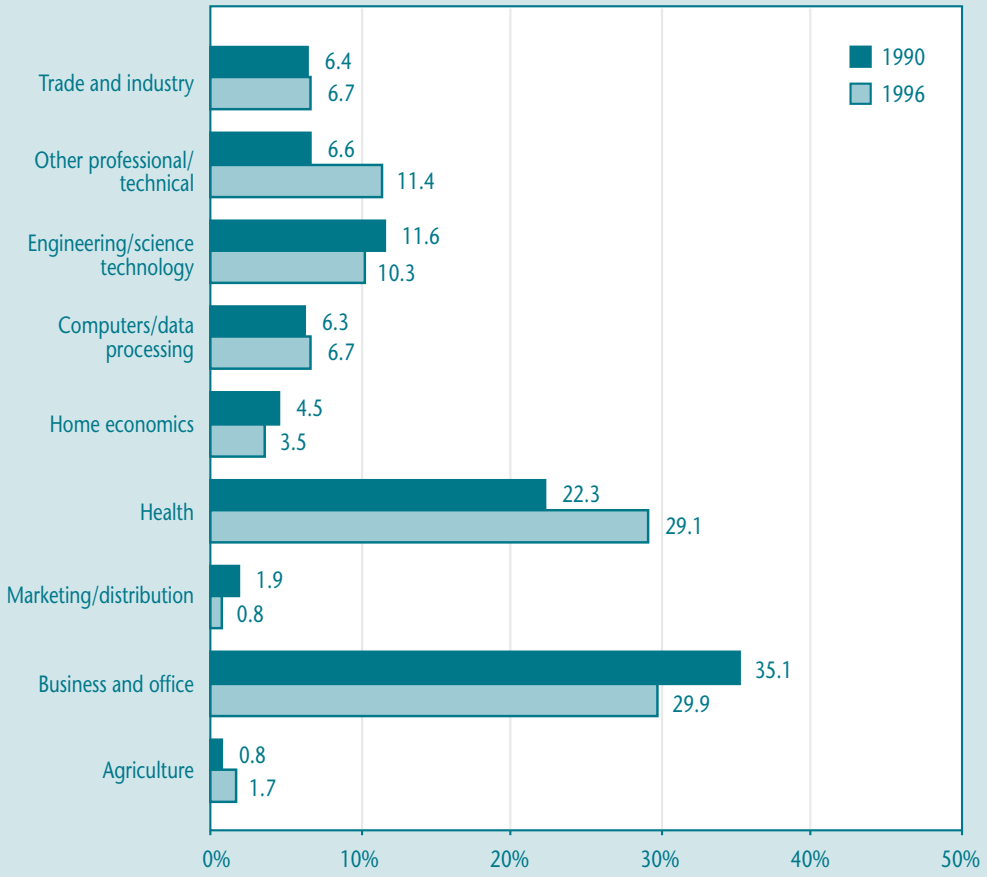
- ***Enrollments in vocational programs have grown substantially since the 1980s.*** Overall enrollments in postsecondary education have increased since the early 1980s, with enrollments at the sub-baccalaureate level remaining consistent with that trend. Between 1989–1990 and 1995–1996, enrollments in various vocational associate degree programs grew (Figure 3.2a) by 27.0 percent overall, perhaps in response to strong employment growth during that period in fields that require such training (Silverberg et al. 2002). More recent data suggest that postsecondary enrollments in general and, for the most part, those in sub-baccalaureate vocational programs, leveled off between 1990 and 2000.

- ***Postsecondary vocational enrollment patterns are generally consistent with labor market shifts by occupational field.*** The most recent analysis of the correspondence between enrollments in postsecondary vocational education and job growth focused on changes that occurred between 1990 and 1996 in particular fields of study and occupations (Erard forthcoming). Both health- and computer-related fields experienced substantial job growth from 1986 to 1996 (Figure 3.2b) and, perhaps in anticipation of robust employment opportunities, the proportion of sub-baccalaureate vocational students enrolled in these programs also increased (Figure 3.2a). Fields

[12]At least in the prominent area of information technology (IT), much of the growth in courses occurs outside the formal postsecondary education system (i.e., courses offered by commercial training providers) (Adelman 2000). A recent survey of community colleges (Haimson and Van Noy forthcoming) indicates that only about a quarter offer courses that prepare students for IT certification in Novell, Microsoft, or Cisco.

[13]Findings presented here emphasize associate degree enrollments. Enrollments in institutional certificate programs appear to be somewhat responsive to labor market shifts as well (see Silverberg et al. 2002).

Figure 3.2a
Percentage Distribution of Students Enrolled in Vocational Associate Degree Programs, by Field of Study: 1990 and 1996



SOURCE: Erard forthcoming. Analysis of the National Postsecondary Student Aid Study, 1989–1990 and 1995–1996.

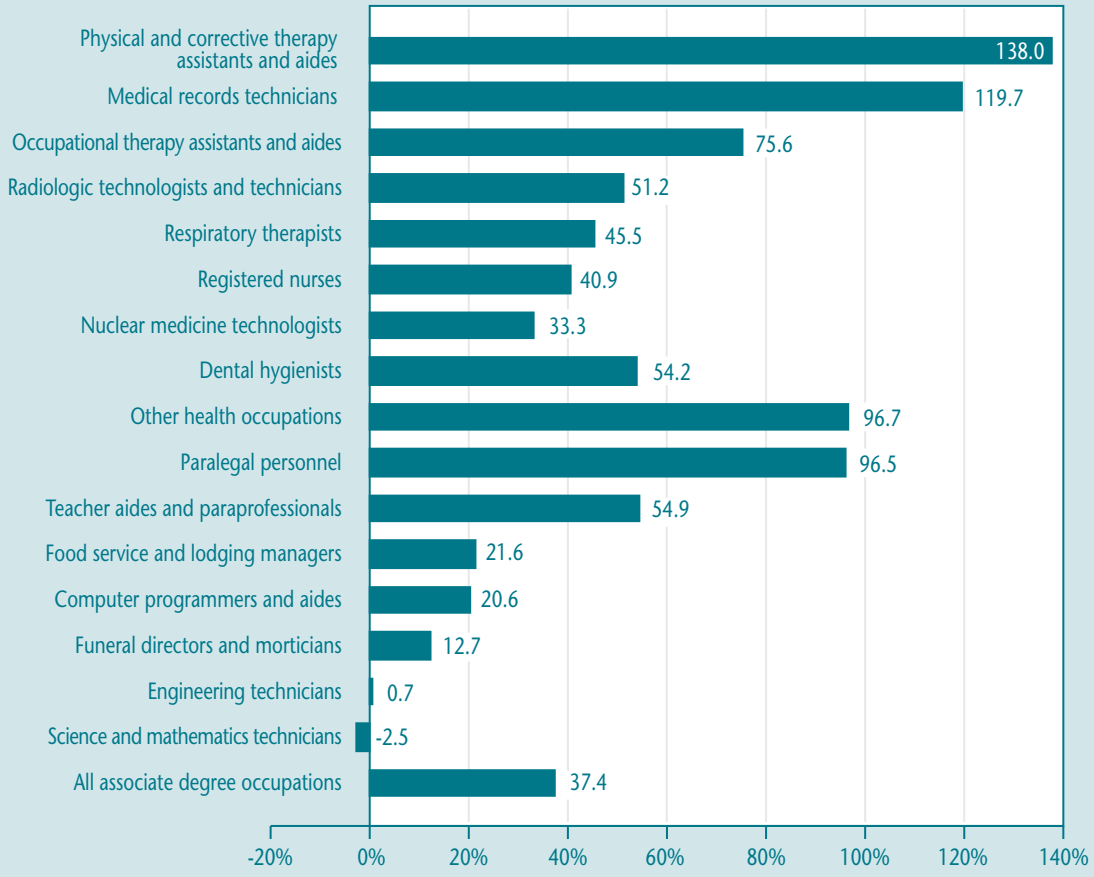
NOTE: Percentages may not add to 100.0 due to rounding.

with relatively slow or even declining job growth between 1986 and 1996—such as business—experienced declines in their postsecondary vocational enrollments.

More recent data generally show consistent patterns in enrollment and labor market demand. For example, enrollments in computer and data processing associate degree programs nearly doubled between 1996 and 2000, possibly in response to past and projected job growth. Health, a large sub-baccalaureate program, may be a notable exception. Despite continued favorable employment projections, enrollments have remained relatively steady since 1996 (Hecker 2001; Bailey, Leinbach, et al. forthcoming).

Figure 3.2b

Percentage Change in Number of Jobs, by Selected Occupational Fields Requiring a Vocational Associate Degree: 1986–1996



SOURCE: Erard forthcoming. Analysis of Bureau of Labor Statistics employment data.

2. Characteristics of Participants: Special Populations and Other Students

Postsecondary vocational programs serve a diverse group of students. Participants include students of all ages as well as those identified as "special populations" in Perkins III (more detail on these students is provided below and in Chapter 2). If policymakers choose to reexamine the role of Perkins at the postsecondary level, it will be important to have an accurate picture of the kinds of students vocational programs serve.

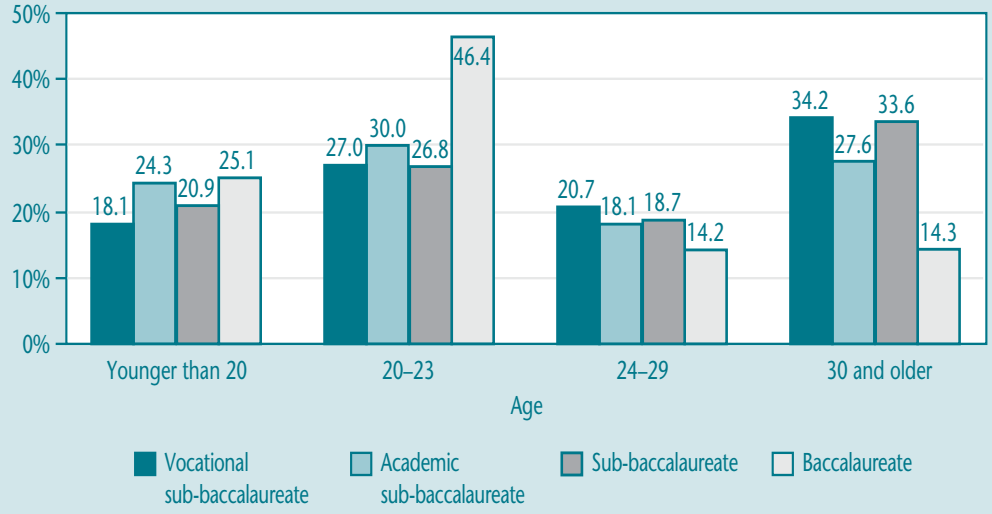
Sub-baccalaureate students differ from students in bachelor degree programs in several important ways. They are older, somewhat more disadvantaged (both academically and

economically), and more likely to pursue postsecondary education at any time (not just immediately following high school) and to pursue it with less intensity and continuity. In contrast, there are fewer differences between sub-baccalaureate students who choose vocational rather than academic programs.

Postsecondary vocational students are older than students in either baccalaureate or other sub-baccalaureate programs.

Postsecondary vocational programs serve both students who recently graduated from high school and older students who may have substantial work experience and prior postsecondary education (Figure 3.3). This diversity in students' age, employment experiences, and educational backgrounds, as discussed later, has implications for the programs they seek and their goals in doing so.

Figure 3.3
Percentage Distribution of Postsecondary Students According to Age, by Major: 2000



SOURCE: Bailey, Leinbach, et al. forthcoming. Analysis of the National Postsecondary Student Aid Study, 1999–2000.
NOTE: Percentages may not add to 100.0 percent due to rounding.

- ***Vocational programs serve younger and older students at similar rates.*** More than half (54.9 percent) of students who declare a vocational major are age 24 and older, with students age 30 and older making up 34.2 percent of all vocational students.[14]

[14]By comparison, less than half (45.7 percent) of the sub-baccalaureate students enrolled in an academic program are age 24 and older, and only 27.6 percent are age 30 and older.

These figures leave a similar and sizable proportion of students (45.1 percent) who are younger and have made a recent transition into postsecondary vocational education from high school. Perhaps most important for federal policy, the younger students represent 56.3 percent[15] of those who enrolled in degree or certificate programs, excluding participants who have returned for a second (or even third) credential.

- ***Sub-baccalaureate participants are significantly older than baccalaureate participants.*** Combining both vocational and academic majors, just over half (52.3 percent) of sub-baccalaureate students are age 24 and older. This proportion stands in sharp contrast to that of baccalaureate students (28.5 percent) who are in that age category. Together, percentage distributions by age suggest that sub-baccalaureate institutions, and vocational programs in particular, serve a much broader population than do four-year colleges and universities.

Academically disadvantaged students are slightly more likely to enroll in vocational programs than in academic sub-baccalaureate programs.

Sub-baccalaureate students, overall, often enter college lacking the necessary academic skills to succeed (Coley 2000). For example, nearly two-thirds of students enrolled in community colleges take some remedial courses (Wirt et al. 2000, p. 152). These statistics signal educational needs that are particularly important for federal policy to address, because academic ability and prior academic preparation are among the strongest predictors of the rates at which students persist in and complete postsecondary education (Horn and Kojaku 2001). Postsecondary vocational students, at least those in for-credit courses and programs, may face some particular challenges.

- ***Younger postsecondary vocational students tend to enter programs with lower levels of academic achievement and preparation than their counterparts in academic programs.***[16] Among younger sub-baccalaureate students, those who enter vocational programs are more likely (66.5 percent) than those who enter academic programs (56.2 percent) to have tested in the bottom half (lowest two quartiles) on a 12th-grade academic skills assessment.

  In addition, like their academic peers, vocational students in sub-baccalaureate programs have not typically taken the rigorous academic curriculum that is required

[15]NAVE internal analyses of NPSAS 2000.

[16]Detailed high school preparation and academic test score data are available only for high school students (the National Education Longitudinal Study (NELS)) and therefore do not represent all postsecondary vocational students.

for those who pursue baccalaureate programs. Although most sub-baccalaureate students met the "New Basics"[17] standard for high school academic course taking—a total of 81.1 percent, including those who were enrolled in a high school vocational program (10.0 percent) and those who were not (71.1 percent)—postsecondary vocational majors were less likely (79.0 percent) than their academic counterparts (84.7 percent) to have met the standards. The proportions of both vocational and academic sub-baccalaureate students who met the "New Basics" requirements are well below that of their baccalaureate counterparts (94.5 percent) (Table 3.2).

Table 3.2
Percentage Distribution of Baccalaureate and Sub-baccalaureate Students, by High School Test Score Quartiles and Program: 1992

	Standardized Reading and Math Test Quartiles		High School Program[1]			
Program	Lowest Two Quartiles	Highest Two Quartiles	At Least New Basics[2]	Both Vocational/ New Basics	Vocational	General
Baccalaureate	22.4	77.6	90.8	3.7	0.7	4.8
Sub-baccalaureate	61.2	38.9	71.1	10.0	5.1	13.9
Vocational	66.5	33.5	67.5	11.5	7.0	14.1
Academic	56.2	43.8	76.1	8.6	2.7	12.6

SOURCE: Bailey, Leinbach, et al. forthcoming. Analysis of the National Education Longitudinal Study, 1992.

[1]Based on high school transcripts.

[2]The "New Basics" core curriculum is defined as four years of English or language arts and three years each of math, science, and social studies.

NOTE: Percentages may not add to 100.0 due to rounding.

► ***An increasing percentage of postsecondary students with vocational majors already possess a postsecondary credential.*** Federal education policy has long promoted students' attainment of a postsecondary credential, although some have argued that such a goal is less relevant for federal vocational policy because so many participants already possess a credential. In fact, between 1996 and 2000, the percentage of students in sub-baccalaureate vocational programs who had already earned a degree (baccalaureate or associate) or certificate increased from 22.8 percent to 30.4 percent (Table 3.3). Sub-baccalaureate students in academic programs were less likely to already possess a postsecondary credential, and this pattern has held steady.

[17]The "New Basics" core curriculum is defined as four years of English or language arts and three years each of math, science, and social studies.

Table 3.3
Percentage of Sub-baccalaureate Students, by Type of Program and Highest Prior Degree: 1996 and 2000 and 1995 and 1999

Type of Program	Year	Highest Prior Degree: None	Certificate	Associate	Baccalaureate	Any Credential
For-credit						
Vocational	1996	77.2	14.6	7.1	1.1	22.8
	2000	69.6	19.2	6.1	5.1	30.4
Academic	1996	80.5	8.8	8.1	2.7	19.5
	2000	76.8	11.5	4.8	6.8	23.2
Noncredit						
Job-related	1995	47.6	n/a	13.6	38.8	52.4
	1999	43.3	n/a	16.8	39.9	56.7

SOURCE: Bailey, Leinbach, et al. forthcoming. Analysis of the National Postsecondary Student Aid Study, 1995–1996 and 1999–2000, and the National Household Education Survey, 1995 and 1999.

n/a = not available or missing data.

Although just under a third of vocational students in credit programs already have postsecondary credentials, an increasing share have already earned a baccalaureate degree. In 1996, only 1.1 percent of postsecondary vocational program participants entered with a baccalaureate degree, but that figure rose to 5.1 percent in 2000. The proportion who entered with a certificate also increased, from 14.6 percent to 19.2 percent, and the certificate remains by far the most commonly held postsecondary credential among those pursuing for-credit vocational course work. In contrast, more than a third of those enrolled in noncredit courses at postsecondary institutions report their highest educational attainment as a baccalaureate degree or higher.[18]

Vocational students are slightly more economically disadvantaged than academic sub-baccalaureate students.

Perkins III emphasizes serving students in special populations, such as those who are economically disadvantaged. Although financial aid is the primary legislative tool to support these students, by encouraging the provision of special support services, Perkins III

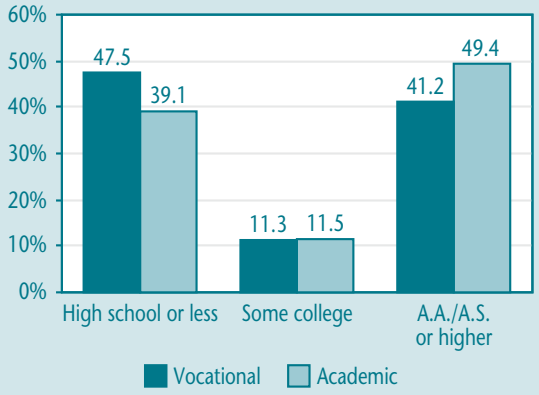
[18]Analyses conducted by the American Association of Community Colleges (AACC) and ACT Inc. suggest that over a quarter of students who enrolled in noncredit courses at community colleges had already attained a bachelor's degree or higher (Phillippe and Valiga 2000).

may encourage low-income students to become successful participants in postsecondary vocational education.

- ***Vocational programs serve a somewhat higher share of economically disadvantaged students than do academic programs.*** Among dependent students—those who live with their parents—a greater proportion pursuing vocational programs (21.2 percent) than academic programs (15.8 percent) live in low-income households (earning less than $20,000 a year). Among independent students, similar proportions of low-income students participate in vocational programs (43.5 percent) as in academic programs (44.6 percent) (Bailey, Leinbach, et al. forthcoming).

- ***Many vocational students are the first in their families to attend college.*** Being the first in the family to attend college is highly associated with limited economic resources and significant barriers to postsecondary enrollment and success (Warburton, Bugarin, and Nuñez 2001). Vocational students are more likely than their academic counterparts at the sub-baccalaureate or baccalaureate levels to be first-generation postsecondary students (Figure 3.4). However, the proportion of first-generation students in postsecondary vocational programs has declined since 1996 (from 55.9 percent to 47.5 percent) (Silverberg et al. 2002).

Figure 3.4
Percentage Distribution of Sub-baccalaureate Students, by Major and Parents' Highest Education Level: 2000



SOURCE: Bailey, Leinbach, et al. forthcoming. Analysis of the National Postsecondary Student Aid Study, 1999–2000.

Students from other special population groups are well-represented in vocational programs.

For nearly four decades, federal vocational policy has encouraged students from specific groups that Congress believed to be underserved or facing particular barriers to involvement in postsecondary education to participate in vocational programs and ultimately in the labor market. Whether due to these legislative provisions or simply individuals' personal preferences and circumstances, in the 1990s many of the "special populations" were well-represented in sub-baccalaureate vocational programs as well as in academic programs.

As described in Chapter 2, these designated "special populations" include individuals with disabilities, individuals from economically disadvantaged families, individuals preparing for nontraditional training and employment, single parents, displaced homemakers, and individuals with other barriers to educational achievement, including limited-English proficiency. Nationally representative data on the postsecondary participation of each of these groups are limited and available only for those students taking for-credit courses.

- ***Vocational programs are more likely than academic programs to serve single parents.*** A higher share of sub-baccalaureate vocational students (19.7 percent) than academic students (12.0 percent) were single parents in 2000, a group that until the passage of Perkins III in 1998, was the focus of targeted programs with set-aside funding. Single parents represented an increasing share of vocational program participants in 2000, up from 16.1 percent in 1996 (Silverberg et al. 2002; Bailey, Leinbach, et al. forthcoming).

- ***Students with disabilities are about equally likely to be enrolled in a vocational program as in an academic program.*** Students with disabilities make up a small share of either baccalaureate or sub-baccalaureate students (less than 2 percent each). These students participated in vocational and academic sub-baccalaureate programs at similar rates in both 1996 and 2000.

- ***Enrollments in vocational programs preparing students for "high-wage"[19] sub-baccalaureate occupations follow traditional patterns by gender, but neither males nor females are clearly advantaged.*** Females increasingly dominate enrollments in fields such as nursing and social work, while males continue to dominate enrollments in engineering, mechanics, and electronics. However, among other majors that prepare students for high-wage occupations (such as finance, mortuary science, and graphic illustration, industrial, interior, or product design), enrollment is fairly balanced by gender, and that balance has not changed substantially between 1996 and 2000 (Table 3.4).

  In the rapidly growing and generally lucrative field of computer and information sciences (often referred to as information technology (IT)), female enrollments have not kept pace with male enrollments. By 2000, the share of males participating in IT programs was twice that of females. Further evidence from a survey of two-year colleges indicates that only about a fifth of those enrolled in some of the most popular IT certification programs (Novell, Cisco, or Microsoft programs) are female

[19] "High-wage" occupations in 1998 were defined here as those with annual earnings of more than $35,000.

Table 3.4

Percentage of Students Enrolled in Vocational Fields of Study Preparing Them for High-Wage Occupations,[1] by Gender: 1996 and 2000

	1996		2000	
Field of Study	**Male**	**Female**	**Male**	**Female**
Precision production (e.g., lithography, upholstery, metal work, drafting, welding)	96.3	3.7	94.2	5.9
Mechanics: Transportation	96.1	3.8	94.4	5.6
Electronics	93.1	6.9	87.6	12.5
Engineering technology	83.8	16.2	84.7	15.3
Communications technology	81.6	18.4	65.7	34.3
Computer and information sciences (hardware and software other than programming)	51.7	48.4	64.2	35.8
Computer programming	51.4	48.6	55.4	44.6
Business: Finance	49.2	50.9	52.7	47.3
Design (e.g., graphic illustration, industrial, interior, or product design)	47.3	52.7	44.2	55.8
Mortuary science	41.2	58.8	57.8	42.2
Data processing technology	30.4	69.6	n/a	n/a
Social work	28.0	72.0	11.4	88.6
Allied health: General and other	50.1	49.9	34.7	65.3
Allied health: Therapy and mental health	27.9	72.1	24.7	75.3
Allied health: Dental and medical technician	19.6	80.4	19.2	80.8
Nursing: Registered nurse	9.7	90.3	9.3	90.7
Nursing: Nurse assisting	4.3	96.7	11.6	88.4

SOURCE: Bailey, Leinbach, et al. forthcoming. Analysis of the National Postsecondary Student Aid Study, 1995–1996 and 1999–2000.

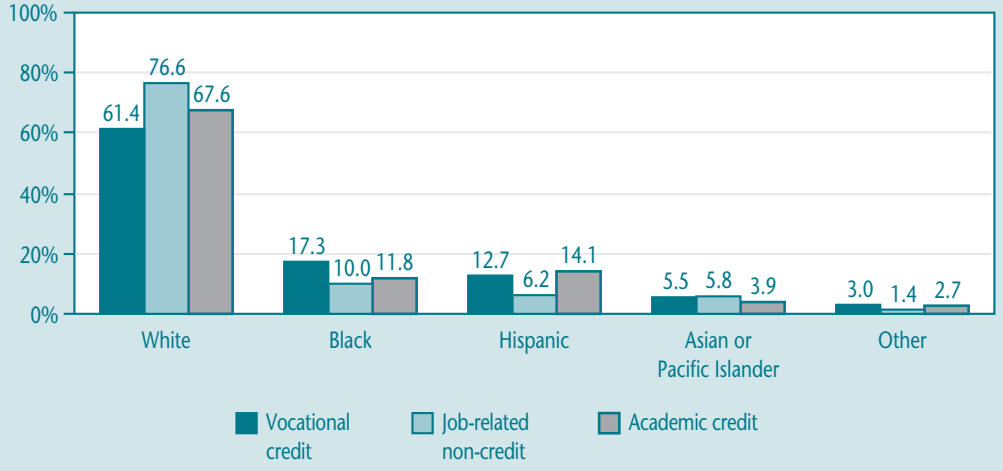
[1]"High-wage occupations" are defined here as those with average annual wages in 1998 that were greater than $35,000.

n/a = not available or missing data.

(Haimson and Van Noy forthcoming). Only a small fraction of community colleges (about 1 in 20) have programs in which the proportions of males and females enrolled are about equal.

- ***Sub-baccalaureate students are racially and ethnically diverse, although vocational programs enroll higher shares of students from racial and ethnic minority groups.*** A higher proportion of black students in 2000 chose to enroll in sub-baccalaureate vocational programs (17.3 percent) than in academic programs (11.8 percent). Hispanic students, however, were just as likely to pursue academic programs (14.1 percent) as vocational programs (12.7 percent), representing a slight relative shift among Hispanic students between 1996 and 2000 toward participation in vocational programs. Asian or Pacific Islander students and those in other racial groups (such as Native Americans) continued to be just as likely to enroll in academic as vocational sub-baccalaureate programs. Many of the noncredit vocational participants were white (76.6 percent), compared to 61.4 percent of vocational students in for-credit courses (Figure 3.5).

Figure 3.5
Percentage Distribution of Sub-baccalaureate Students in Credit and Noncredit Courses, by Race/Ethnicity: 1999 and 2000



SOURCE: Bailey, Leinbach, et al. forthcoming. Analysis of the National Household Education Survey, 1999, and the National Postsecondary Student Aid Study, 1999–2000.
NOTE: Percentages may not add to 100.0 due to rounding.

3. Goals and Pathways of Participants through Postsecondary Vocational Education

Many people, perhaps including policymakers, view "college participation" in a traditional way. They picture participants as 18-year-olds who attend college in the fall immediately following high school graduation and who continue to attend full-time until they obtain baccalaureate degrees approximately four years later. However, this description of college participation does not describe the majority of sub-baccalaureate students or of vocational students in particular. Vocational students typically delay entering college after high school graduation, are enrolled part-time and intermittently, and attend multiple postsecondary institutions. Each of these traits is a well-documented barrier to credential completion.

Postsecondary vocational students have primarily "nontraditional" attendance patterns.

Students participating in sub-baccalaureate programs—both academic and vocational—do not typically follow the attendance patterns often associated with "college" enrollment. "Nontraditional attendance"—part-time, at multiple institutions, with interruption—is common (Table 3.5) (Bailey, Leinbach, et al. forthcoming).

Table 3.5
Percentage of Postsecondary Students with Various Attendance Patterns, by Program: 2000

	Sub-baccalaureate		
Attendance Patterns	Vocational	Academic	Baccalaureate
Worked while enrolled	82.9	83.6	77.0
Interrupted participation[1]	30.0	39.8	25.2
Full-time, full-year participation	27.9	30.5	61.8
Delayed entry[2]	52.9	42.2	22.4

SOURCE: Bailey, Leinbach, et al. forthcoming. Analysis of the Beginning Postsecondary Students Longitudinal Study, 1989–1994, and the National Education Longitudinal Study, 1988–2000.

[1]"Interrupted participation" is defined here as any interruption in postsecondary participation within the five years of data collection. The numbers here are derived from data in the Beginning Postsecondary Students Longitudinal Study, 1989–1994.

[2]"Delayed entry" adheres to the National Postsecondary Student Aid Study definition, which includes any student who either enrolls in postsecondary education a year or more after high school graduation or is a General Educational Development (GED) recipient prior to enrollment.

- ***Most postsecondary students, including those in vocational programs, work while enrolled; half of sub-baccalaureate students consider themselves workers first, and students second.*** A large proportion of students—about four out of five students at any level (baccalaureate or sub-baccalaureate) or major (vocational or academic)—are employed while in postsecondary education. Baccalaureate students describe themselves as primarily students (over 80 percent) and thus are likely working to defray expenses. In contrast, just over half of the employed sub-baccalaureate students describe themselves as workers who are studying.

- ***Increasingly vocational as well as academic students interrupt their postsecondary education.*** About a third of vocational (30.0 percent) and 39.8 percent of academic sub-baccalaureate students interrupt their postsecondary attendance at least once during a five-year period. Furthermore, among participants younger than age 24, the rate of interruption has doubled since the 1980s (from 15.9 percent in 1982 to 33.3 percent in 1990).

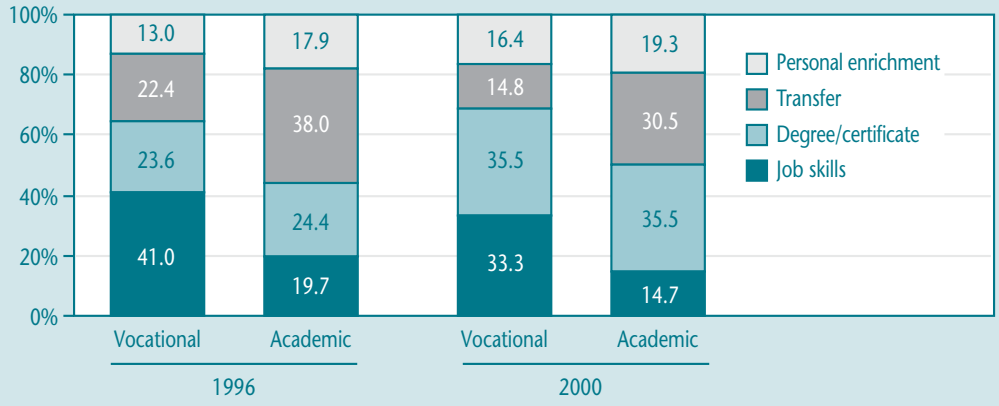
- ***Delayed entry into postsecondary sub-baccalaureate education is common, as is part-time attendance, often in multiple institutions.*** Just over half of vocational program participants (52.9 percent) begin postsecondary education more than a year after graduation from high school. This delayed entry is more likely among vocational (52.9 percent) than academic (42.2 percent) sub-baccalaureate students, but the likelihood of doing so is even greater for baccalaureate than sub-baccalaureate students (22.4 percent and 49.8 percent, respectively). Just over one-fourth of either vocational or academic students in sub-baccalaureate programs attend full-time, full-year, compared to 61.8 percent of baccalaureate participants. Recent analyses of traditional age students (ages 18 to 24) indicate that nearly half of those who started in community colleges actually attended more than one institution as an undergraduate (Adelman 2003).

On the one hand, the ability of students to attend postsecondary institutions part-time when they can and at the most convenient campus are all hallmarks of sub-baccalaureate institutions. On the other hand, these attendance patterns raise concerns about the labor market prospects for sub-baccalaureate students, including those in vocational programs, because research indicates a relationship between nontraditional enrollment patterns and lower earnings (Scott and Bernhardt 1999; Light 1995). To the extent that completion is an important factor in this relationship, federal policy may wish to continue to emphasize completion, whether defined as "credential attainment" (as is currently promoted through the accountability provisions) or something else.

Objectives of postsecondary vocational students vary, but most report seeking a credential.

Given the diversity of those who participate in sub-baccalaureate vocational education—in age, employment status, income, and other characteristics—it is not surprising that vocational courses serve a variety of purposes. Recent surveys asked students to report the primary reason they enrolled in postsecondary course work, requesting them to choose from several fixed response categories: job skills, degree or certificate completion, transfer (to a higher-level educational institution), or personal enrichment.[20] Understanding the variation in students' goals and expectations is useful for judging the success of both students and institutions (Figure 3.6) (Bailey, Leinbach, et al. forthcoming).

Figure 3.6
Percentage Distribution of Sub-baccalaureate Students, by Major and Reported Primary Goal: 1996 and 2000



SOURCE: Bailey, Leinbach, et al. forthcoming. Analysis of the National Postsecondary Student Aid Study, 1995–1996 and 1999–2000.
NOTE: Percentages may not add to 100.0 due to rounding.

- ***Obtaining a sub-baccalaureate credential or transferring is a common objective for vocational students but less so for academic students.*** Just over half of all those enrolled in postsecondary vocational programs in 2000 reported wanting to earn a degree or certificate (35.5 percent) or to transfer (14.8 percent). This pattern represents a change from 1996, with less emphasis in 2000 on transferring (down from 22.4 percent) and more emphasis on attaining a sub-baccalaureate credential (up from 23.6 percent) as a primary goal.[21] Younger students are most likely to

[20]Even though students were asked to select a primary reason, these reasons may not be mutually exclusive.

[21]Academic majors report similar shifts in objectives.

be seeking these objectives: in 2000 most vocational majors younger than age 20 reported earning a credential (33.9 percent) or transferring to further education (26.7 percent) as their primary reason for participating.

The goal of obtaining a degree or certificate or of transferring to another institution is even more common among students in sub-baccalaureate academic majors than in vocational majors (a total of 66.0 percent compared to 50.3 percent). The biggest difference by major is that fewer vocational students (14.8 percent) than academic students (30.5 percent) cite transferring as their primary reason for enrolling in postsecondary vocational programs. These differences in objectives are consistent with differences in students' stated educational aspirations. Vocational students are less likely (74.0 percent) than academic students (88.4 percent) to expect to complete baccalaureate-level or higher degrees. Instead, those who enroll in postsecondary vocational programs more frequently aspire to earn certificates or associate degrees. Between 1996 and 2000, there was no statistically significant shift in the aspirations of either vocational or academic participants.

- ***Many students enrolled in sub-baccalaureate vocational programs want to increase their job skills.*** Among those choosing a vocational major, a significant share (33.3 percent) do so to enhance their job skills, probably with the intention of obtaining better employment. In contrast, only 14.7 percent of academic students cite improving their job skills as their primary reason for enrolling.

  Older vocational students are most likely to pursue this goal. Still, less than half (41.6 percent) of those age 30 and older cite increasing their job skills as their primary reason for participating in vocational courses and programs. For many older students (39.7 percent) obtaining a credential is still important (Bailey, Leinbach, et al. forthcoming).

- ***Some vocational students participate for enrichment purposes.*** Far fewer students, both vocational (16.4 percent) and academic (19.3 percent), cite personal enrichment as their primary reason for enrolling in postsecondary course work.

C. Implementation: Program Quality and Improvement Efforts

Perkins III provides funding to improve the quality of vocational programs at both the secondary and postsecondary levels and offers a set of strategies intended to aid in that progress. However, the effects of the law at the postsecondary level are difficult to assess for several reasons. First, postsecondary institutions are historically autonomous—from each other and from state agencies—yet Perkins policy is intended to be promoted through state efforts. Second, Perkins funds represent a very small share—about 2 percent[22]—of these institutions' yearly expenditures. Finally, at the postsecondary level, where participants pay to receive their education and training, vocational programs are most likely driven by rapidly changing labor market needs. Postsecondary institutions' response to the challenge of providing up-to-date technical training and education may be consistent with federal policy but not largely affected by it.

Still it is worth examining the prevalence of Perkins program improvement strategies.[23] Among the most relevant for postsecondary programs are the integration of academic and vocational instruction, links between secondary and postsecondary institutions, employer involvement, education standards, upgrading technology, and assistance for special populations. Professional development and other efforts to promote teacher quality are also important and frequently supported with Perkins funds.

Employer involvement takes many forms, largely influenced by labor market trends.

Employer involvement in postsecondary vocational programs is considered particularly important because it helps ensure that the content and focus of these programs are relevant to the labor markets they serve. Unlike high school vocational students, many of whom will pursue postsecondary education and eventually jobs outside their local areas, community college students are likely to work and live in their communities. Therefore, most postsecondary vocational institutions try to pursue strategies that are consistent with what will be rewarded in their local labor markets.

- ***Employer involvement in community college advisory committees may be growing.*** Industry- or community-based advisory committees, while not new to these institutions, appear to be gaining influence. The proportion of employers reporting that they participated in these committees at the secondary or postsecondary level

[22]See Chapter 5 for a discussion of the 2 percent estimate.

[23]See Chapter 2 for a more detailed discussion of these practices and how the law promotes them.

increased from 12.4 percent in 1993 (Boesel et al. 1994b) to 14.1 percent in 2000,[24] although evidence from case studies suggests that much of the increase has been at community colleges. Advisory committees actively contribute to vocational programs by providing advice on individual courses and programs as well as offering off-campus learning experiences for students and faculty. This level of employer involvement is in contrast to that provided by previous advisory committees that only met once or twice a year and had little influence over program design or curricular content.

- ***Employers increasingly use community colleges for customized contract training.*** As part of a growing emphasis on economic and workforce development, community colleges have increased their customized contract training. The proportion of employers reporting their use of such training increased significantly during the 1990s, from 9.9 percent in 1993 (Boesel et al. 1994b) to 17.2 percent in 2000. Although customized contract training is often distinct from postsecondary vocational education programs, because training is conducted at another part of campus, uses separate funds, and is often taught by a different faculty, the general trend may be indicative of a broader effort by community colleges to meet local labor market needs.

- ***Employer collaboration on curriculum is geared more toward local needs than national skill standards.*** According to case studies, community college curriculum is shaped mostly by a determination of which skills contribute to employability in the local area (Hudis, Blakely, and Bugarin forthcoming). National skill standards matter, but only if they have value in the marketplace. So, while community colleges have been quick to create course work that complements information technology networking certifications that are nationally recognized, such as Microsoft's or Cisco's, the colleges have been much less likely to organize curricula around Microsoft's Microsoft Office User Specialist (MOUS) certification program, a credential that lacks employer support.

Upgrading equipment remains a focus of community college efforts, but the contribution of Perkins is proportionately less than it is at the secondary level.

"Developing, improving or expanding the use of technology in vocational and technical education" is a required activity for states and postsecondary institutions that receive federal vocational funds (Section 135(b)). Given the pervasiveness of new technologies in the workplace, there is constant need for technological resources and technology instruction in community colleges and adult vocational schools. Employers increasingly

[24]NAVE internal analyses of the National Employer Survey, 2001.

demand technological skills and expect graduates of sub-baccalaureate courses and programs to have knowledge of and facility with these technologies (Hudis, Blakely, and Bugarin forthcoming). Meeting these demands and expectations, though, is a primary mission of these colleges.

- ***Perkins funds are a relatively small contribution to postsecondary equipment budgets.*** Postsecondary vocational institutions, in contrast to vocational programs at the secondary level, typically have a substantial technology budget. Therefore, ongoing equipment needs are largely funded by private donations, business partners, state grants, and college revenues, while state and local Perkins funds are simply additional but not central contributions. In addition, community colleges combine Perkins funds with other federal grants to train faculty to use the new equipment.

- ***Some states use Perkins funds to support distance learning or development activities such as planning for emerging occupational areas.*** For example, North Carolina has made distance learning a priority in its community colleges, reaching more than 12,500 students via the Internet, satellite transmission, and teleconferencing. In Michigan, some Perkins state leadership funds are used to fund Emerging Technologies Consortium Grants, which are intended to encourage vocational programs to plan for new occupations in high-technology or other emerging occupational areas.

Support for special populations generally continues.

Previous vocational legislation placed special emphasis on serving particular groups of students known as "special populations." In Perkins III, Congress continued this focus but through accountability provisions rather than funding set-asides.[25] The emphasis on these groups persists among postsecondary institutions, which often refer to Perkins funds as their "special populations" money (see Chapter 5 for more information on funding and accountability). Preliminary evidence suggests that, in general, the goal of serving special populations has been institutionalized. At the local level, where most activities supporting special populations take place, many programs continue to serve their special needs, and these activities have not changed much even with the elimination of the set-aside funding streams under Perkins III (Hudis, Blakely, and Bugarin forthcoming).

[25]Perkins II required that at least 3 percent be set aside from the basic state grant for programs and services to eliminate gender bias as well as at least 7 percent set aside for programs and services to meet the needs of single parents, displaced homemakers, and single pregnant women. These set-asides were eliminated in the subsequent reauthorization in 1998 (Perkins III) and replaced by accountability provisions that require states to report progress related to educational and employment outcomes for these groups.

- ***Support services for special populations funded by Perkins cover a broad range of activities at both the local and state levels.*** Most postsecondary institutions assist existing special population students rather than conduct outreach, because they view access as best provided through student aid.[26] Both states and local institutions also provide professional development support and activities for faculty serving special population students. A primary focus of local institutions is to help students successfully complete courses and programs through basic academic support services, such as tutoring, note-taking services, testing, and the provision of interpreters. Additional services—such as childcare and transportation—are more focused on the needs of particular populations.

- ***Postsecondary institutions provide services to help special population students make the transition into employment.*** These services, typical of community colleges, include career counseling, job seminars, and skill-training programs, but they are often tailored to meet the special needs of particular groups and funded at least in part by Perkins. Florida and Texas have developed accountability systems to make sure that community colleges are placing special population students in good jobs. At the local level, for example, a North Carolina community college offers classes that give students a broad orientation to the labor market to meet the needs of older students who are making transitions into the workforce for the first time (e.g., students on welfare, displaced homemakers, and single mothers) (Hudis, Blakely, and Bugarin forthcoming).

- ***Elimination of set-asides appears to have made services available to a broader population.*** Some local practitioners indicate that, because of the new legislation, special vocational programs and services can now serve GED students, economically disadvantaged students, and individuals with limited English proficiency, in addition to single parents or single pregnant women and individuals preparing for nontraditional employment.

Other program improvement strategies emphasized in the law are not emphasized at the postsecondary level.

In addition to the strategies discussed above, Perkins promotes linkages between secondary and postsecondary education and the use of curriculum integration. However, Tech-Prep and articulation agreements between high schools and community colleges, in addition to integrating academic and vocational curricula, are largely viewed by postsec-

[26]It should be noted, though, that some colleges support access to financial aid by providing services—funded by Perkins—to help special population students navigate the complex student financial aid system.

ondary staff as high school programs and strategies designed to raise expectations among secondary vocational students.

- ***Limited linkages exist between secondary and postsecondary education.*** Community colleges have played active roles in developing and updating articulation agreements as part of Tech-Prep, but few of them have actually changed their offerings or activities as a result of this initiative (see Chapter 4). Other types of coordination, such as outreach activities—e.g., bringing students to campus and arranging meetings between college and high school personnel to discuss student test scores and required preparation for college—are generally low intensity (Hudis, Blakely, and Bugarin forthcoming). Perkins-funded state leadership spending at the postsecondary level suggests that secondary-postsecondary linkages (7.7 percent of these funds nationally) are not as high a priority as other activities (e.g., more than 15 percent of state leadership funds are used for each of these efforts: upgrading technology, integration, and data reporting; White et al. forthcoming).

- ***Dual enrollment is so far a limited, but promising, strategy for linking secondary and postsecondary vocational education.*** Although neither widely taken advantage of by high school students nor exclusively or specifically designed for students in vocational programs, this strategy is increasing in popularity (Bailey, Hughes, and Karp 2002). High school students can enroll in courses at community colleges that allow them to earn both secondary and postsecondary credit. As a result, they can have a wider selection of courses and learn more about community college life and course expectations.

- ***Curriculum integration remains relatively rare at the postsecondary level, despite continued emphasis in the law and reported state activities.*** Certainly, some states and community colleges are using Perkins funds for faculty workshops on integrating curriculum. Nationally, strengthening integration of academic and vocational content is one of the top two expenditure categories of state leadership funds (15.3 percent). For example, Michigan awarded grants to produce new curricula, and Florida is developing new certificate programs that require an integrated course curriculum. One Michigan grant, for example, brought together 80 faculty members from 15 community colleges to work on producing integrated curricula that they could use in classrooms. California has also used state leadership funds to support statewide conferences and workshops on curriculum integration. However, these efforts have not translated into widespread action. According to site visits, most community colleges and their faculties lack the curriculum materials or professional development opportunities to achieve meaningful integration (Hudis, Blakely, and Bugarin forthcoming).

Improving the quality of vocational faculty, a goal that Perkins supports to some extent, remains a challenge.

Perkins III encourages professional development as a way to improve teacher quality. States, in particular, but also individual postsecondary institutions, at times combine Perkins funds with workforce development and general education funds to compensate teachers for time and expenses spent at professional meetings, to offer workshops and conferences, and to support teacher externships. However, many of the most crucial issues involve hiring and retaining faculty with the appropriate mix of skills, and doing so in a way that is responsive to labor market demands. It is less clear what kind of role Perkins can assume in those efforts.

- ***Some individual institutions and states use Perkins funds to offer professional development activities to promote technical and teaching skills.*** These efforts are limited and often primarily include state-sponsored conferences covering a wide array of professional development issues. Few faculty members from any single institution appear to participate, and such once-a-year professional development activities are often considered fairly ineffective. In short, there is little evidence of systematic professional development efforts on behalf of vocational faculties (Hudis, Blakely, and Bugarin forthcoming).

- ***Sub-baccalaureate vocational faculties have lower academic credentials than academic faculties.*** In 1999, a significant share of vocational faculty members (46.0 percent), compared to their academic peers (14.4 percent), had bachelors' degrees or less. Academic faculty members were far more likely than vocational faculty members to have masters' degrees, Ph.D.s, or first-professional degrees[27] (85.6 percent compared to 54.1 percent).[28] These percentages have remained unchanged between 1993 and 1999 (Figure 3.7).[29]

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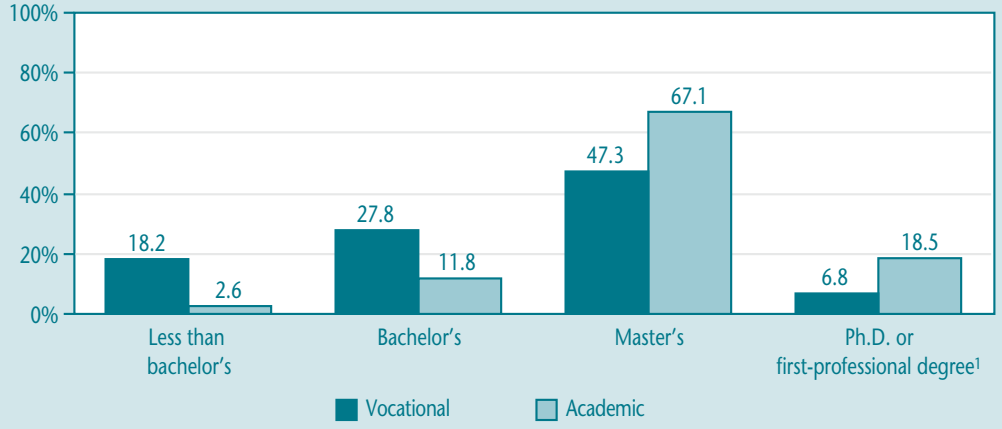
[27]A first-professional degree is one that signifies both completion of the academic requirements for beginning practice in a given profession and a level of professional skill beyond that normally required for a bachelor's degree. These degrees include fields such as dentistry, medicine, pharmacy, law, and theological professions.

[28]The proportion of faculty with a bachelor's degree or less is most characteristic of faculty in the trade and industry field (65.8 percent). However, the proportion without advanced degrees is still significant in other vocational fields, ranging from a low of 27.3 percent in business to a high of 43.0 percent in health. Part-time vocational faculty are also the most likely to be without advanced degrees (47.6 percent among part-time and 33.7 percent among full-time faculty) (Internal NAVE analyses of NSOPF 1999).

[29]In 1993, the proportion of vocational faculty members with a bachelor's or less is 46.5 percent and 19.7 percent for academic faculty members. Similarly, the proportion of vocational instructors with a master's as their highest credential attained is 45.6 percent and 64.8 percent among academic faculty members (Internal NAVE analyses of NSOPF 1993).

Figure 3.7
Percentage Distribution of Sub-baccalaureate Faculty Members, by Program and Highest Credential Attained: 1999



SOURCE: NAVE internal analyses using National Study of Postsecondary Faculty 1999.

[1]A first-professional degree is one that signifies both completion of the academic requirements for beginning practice in a given profession and a level of professional skill beyond that normally required for a bachelor's degree. These degrees include fields such as dentistry, medicine, pharmacy, law, and theological professions.

NOTE: Percentages may not add to 100.0 due to rounding.

In vocational fields, a conflict exists between the need for academic skills and the need for hands-on technical skills for high-quality teaching. Industry skill certifications may be equally or even more important for instructors than academic credentials, particularly in fields such as information technology and automotive repair. On-the-job experience or teaching while employed are important ways for faculty to keep technical skills current, especially because local institutions seem to have few systems in place to support ongoing professional development. However, in an environment of increasing academic sophistication in many vocational fields, academic qualifications may become more important.

- ***Many vocational instructors, like their academic counterparts, teach part-time, have multiple jobs, and may work in jobs related to the courses they teach.***[30] In 1999, the majority of vocational (60.0 percent) and academic (66.3 percent) sub-baccalaureate faculty members taught part-time. These proportions have not changed since 1993. Among part-time vocational instructors, most reported a preference for teaching part-time (80.7 percent).

[30]NAVE internal analyses based on National Study of Postsecondary Faculty (NSOPF), 1993 and 1999.

Teaching part-time is often thought to be an indicator of lower teacher quality, reflecting poorer qualifications or more tenuous connections to the sub-baccalaureate institution. In the case of vocational education, though, working part-time may allow vocational faculty members to remain employed in jobs related to the courses they teach. In fact, the majority of vocational faculty reported having another job (71.1 percent), and most said they work outside of postsecondary institutions (92.6 percent). Although information about these other jobs is limited, many may be employed in occupations in their teaching field (e.g., 49.4 percent of health faculty worked in a hospital as their additional job).

- ***Changes in faculty composition and student enrollment are consistent with labor market trends—growth in information technology and declines in business, engineering, and home economics.*** Two-year institutions, and community colleges in particular, are often thought to be especially adept at adjusting their offerings in response to fluctuating enrollment shifts, which often reflect changing labor market trends. The ability to hire and retain faculty in sufficient numbers, particularly in high-demand fields, to maintain reasonable student-to-faculty ratios is crucial to maintaining the quality of postsecondary vocational education.

  Data from the National Postsecondary Student Aid Study (NPSAS) and National Study of Postsecondary Faculty (NSOPF) confirm a link between changes in the percentage of faculty who teach and students who enroll in two-year institutions by vocational field (Table 3.6). Since 1993, the rates of enrollment in information technology (IT) and trade and industry have increased, as have the proportions of vocational faculty teaching IT and trade and industry courses, presumably in response to increases in enrollment. Between 1993 and 1999, vocational enrollments shifted away from business, home economics, and engineering—most likely reflecting reduced demand for occupations requiring such training. Correspondingly, during that period, the percentage of vocational faculty teaching in each of these three fields declined. In other fields—health and agriculture—no significant changes were observed in the proportions of students and faculty in two-year institutions.

- ***The proportion of vocational faculty members at two-year institutions declined, and academic faculty members increased during the 1990s.*** Although both academic and vocational enrollments in community colleges leveled off in the 1990s after a decade of growth,[31] the number and proportion of vocational faculty members at two-year institutions declined by 8 percent (from 98,741 to 90,771),

[31]From 1990 to 1993, enrollments at two-year institutions spiked, most likely in response to the 1991 recession. Corresponding to the economic recovery, enrollment figures returned to 1990 levels, with no statistically significant difference between enrollments in 1990, 1996, or 2000.

Table 3.6

Percentage of Students and Percentage of Faculty in Two-Year Institutions, by Vocational Field: Selected Years 1990–2000

Vocational Field	Year	Percentage of Students	Percentage of Faculty
Agriculture	1990	0.8	
	1993	3.0	1.7
	1996	2.0	
	1999–2000	1.0	1.9
Business	1990	41.0	
	1993	35.6	29.1
	1996	32.9	
	1999–2000	32.0	24.9
Health	1990	25.4	
	1993	32.1	30.8
	1996	33.2	
	1999–2000	25.9	31.5
Home economics	1990	4.0	
	1993	1.7	2.0
	1996	3.6	
	1999–2000	2.2	0.6
Technical education	1990	24.2	
	1993	20.1	23.3
	1996	18.4	
	1999–2000	25.4	28.0
Information technology	1990	6.8	
	1993	9.5	12.2
	1996	6.1	
	1999–2000	16.7	18.8
Engineering	1990	13.3	
	1993	8.9	8.5
	1996	11.6	
	1999–2000	6.3	6.6
Trade and industry	1990	4.7	
	1993	7.5	13.1
	1996	10.0	
	1999–2000	13.5	13.2

SOURCE: Internal NAVE analyses using NPSAS:1990, 1993, 1996, and 2000 and NSOPF:1993 and 1999.

while the proportion and number of academic instructors increased by 20 percent (from 160,831 to 193,333).[32] There are several potential explanations for this shift in resources. First, there may have been a change toward having academic faculty teach the academic course work required in vocational programs rather than offering these courses as "applied" academic courses taught by vocational faculty. Second, in recent years, some institutions have paid more attention to providing students with options to transfer to a baccalaureate degree program, which may also have increased academic offerings and thus faculty. Finally, an increase in academic faculty may reflect a growing need for faculty to teach developmental education courses.

It is hard to gauge the implications of these changes. On the one hand, the quality and rigor of academic courses may be superior and thus more beneficial to vocational students. On the other hand, if such courses are less likely to be connected to particular vocational learning requirements, then it is unclear whether vocational students, who often have not been successful in traditional academic course work, will be able to benefit from the shift in emphasis.

D. Coordination with the Workforce Investment Act

Coordinating vocational programs with workforce development efforts is a major issue at the postsecondary level. When Congress enacted both the Perkins III and the Workforce Investment (WIA) Acts in 1998, it responded to GAO reports that multiple job training programs created an excessive administrative burden upon states and discouraged individual access to services (U.S. General Accounting Office 1994a, 1994b, 1994c, 2000). Many policymakers argued that the system—and, in particular, federal funding—needed streamlining, and Congress considered combining the two laws. In the end, however, Congress passed separate acts with provisions to encourage coordination between activities funded under WIA Title I and Perkins III. The extent of that coordination, even at this early stage of implementation, is worth examining.[33]

Several features of WIA can affect postsecondary vocational education.

- ***State Workforce Investment Boards:*** These boards assist in the development of the WIA state plans, and the law includes the chief executive officers from community colleges among the list of required members (Section 111(b)).

[32]NAVE internal analyses using NSOPF:1993 and 1999.

[33]Given that the Workforce Investment Act and the reauthorization of Perkins allow for a transition year, the findings discussed in this report are early indicators of the implementation of the two laws.

- ***One-Stop Career Centers:*** Governed by Workforce Investment Boards (WIBs) at both the state and local levels, these centers are expected to provide information to job seekers and access to a broad array of employment and training services. Although in some states and localities postsecondary vocational institutions were involved with past workforce development efforts under the old Job Training Partnership Act (JTPA), WIA requires that these institutions be included in the WIBs. Including them provides new opportunities for previously nonparticipating postsecondary institutions to become involved with workforce development. Their involvement as one of the required partners in One-Stop centers is an indicator that at least some coordination should exist between postsecondary vocational education and workforce development systems.

- ***Available services:*** Up to three possible types of services are now provided sequentially, depending on individual needs and eligibility: (1) core services—primarily information on job options—are available to all individuals; (2) intensive services, for those needing more assistance, include individualized assessments, case management services, and short-term prevocational services such as basic adult education courses; and (3) training services are primarily offered to income-eligible individuals for whom the two previous services are not sufficient in helping them obtain employment.[34] This sequencing of services places greater emphasis on job placement, in contrast to the past emphasis on increasing an individual's human capital through job training. Individuals eligible for job training are provided Individual Training Accounts (ITAs) that can be used to purchase training from any eligible provider. This practice contrasts with the past one of offering individuals prepaid negotiated training services. It is not yet clear whether this new structure is more or less conducive to the involvement of postsecondary vocational education in workforce development.

Perkins institutions have not played a major role in WIA decision making and management in most states.

In the first few years since the passage of WIA, states have primarily directed their attention to establishing organizational structures to implement the act—e.g., state and local workforce investment boards and One-Stop centers. The role that postsecondary vocational institutions played in these decisions is likely to affect their participation in future workforce development activities.

[34]WIA requires states and local programs to give priority to low-income individuals for intensive training services when funds are limited (Sec. 134(d)(4)E) of WIA).

- ***Postsecondary vocational institutions generally were not involved in early efforts to establish the infrastructure of One-Stop Career Centers.*** As required in the law, states did include representatives from community colleges to serve in the new WIBs. However, in most states and localities, past relationships formed under JTPA determined the organization and governance for the workforce development system under WIA. An early Department of Labor report (D'Amico et al. 2001) indicates that half of the states simply adopted their existing state workforce investment board, although most local boards were more likely to be newly formed.

  In states where community colleges historically had played a significant role in either JTPA or economic development (e.g., North Carolina and Florida), the relationship generally has continued and made seamless service delivery systems more likely, although the extent of local participation even in these states is idiosyncratic. In most cases, though, community colleges and the postsecondary education system have played a more limited role in setting up the workforce development system and its rules of governance. For example, the Massachusetts State Board of Higher Education that oversees community colleges was not included among the partner organizations that established the workforce development system. Similarly, in California, the Community College Chancellor's Office envisions participating in the system only after it is implemented (Hudis, Blakely, and Bugarin forthcoming).

- ***Most One-Stop centers are operated without much involvement from postsecondary institutions.*** Most states are neutral about having community colleges become managers of and service providers for One-Stop centers. But some have discouraged that participation. Despite initial plans for two-year colleges to be given major responsibilities in planning the new system, Texas curtailed postsecondary involvement by prohibiting operators of local One-Stop centers from providing both core and training services; thus, if two-year colleges want to provide training, they cannot operate a One-Stop center. In Massachusetts, none of the centers are operated by community colleges. Although the state established a competitive process to select One-Stop center operators, none of the 15 community college and 16 WIB service delivery areas overlap, perhaps accounting for the colleges' limited participation. In contrast, in both Florida and North Carolina, where community colleges are key local participants in the workforce system, these institutions are well-represented among those operating One-Stop centers; for example, in 2000 a quarter of the centers in North Carolina were located on community college campuses, and close to 20 percent of Florida's centers were administrated or operated by community colleges (Hudis, Blakely, and Bugarin forthcoming).

Involvement in a One-Stop partnership can be important because it can lead to many referrals for training, although that has not occurred in most communities. The services available at One-Stop centers allow individuals to find out about various educational options. Even if individuals do not use individual training accounts, they may pursue postsecondary education using other resources such as Pell grants and student loans (King 2002).

- ***Historical participation in training programs influences the extent of WIA participation.*** The strongest predictor of a community college's participation in WIA is its previous involvement in JTPA-funded training activities. Postsecondary institutions that were active and major providers of services under JTPA generally have continued to play important roles under WIA. For example, a Massachusetts community college that was a significant training provider under JTPA continues to work closely with the workforce system despite the fact that a smaller number of students are served under WIA. Even in states with systems favorable to community colleges, such as Florida and North Carolina, there appears to be a strong correlation between current participation in WIA and past participation in JTPA (Hudis, Blakely, and Bugarin forthcoming).

Involvement of Perkins institutions in providing WIA services has been limited.

Postsecondary vocational education generally has yet to become actively involved in providing WIA services. Because community colleges primarily provide education and training, and early WIA implementation emphasized job search and other core services, community college participation and interest in WIA activities have been limited.[35]

- ***Early emphasis on core services favored the involvement of entities other than vocational postsecondary institutions.*** Core services—providing information about job opportunities and available support services—are not a primary part of the mission of community colleges. Even intensive services (e.g., aptitude and occupational interest testing and very short-term prevocational services) are not central services that postsecondary educational institutions offer. Early indications are that most WIA resources were used for these services as well as to create the new infrastructure, leaving little money for vocational training supported by individual training accounts—the most natural activity for Perkins postsecondary institutions.[36] When

[35]Florida and, to a lesser extent, North Carolina are again exceptions. In both states, community colleges either played a central role in workforce development (under JTPA) or economic development. Presumably because of these ties, community colleges in these states tended to be involved in WIA beyond training services (e.g., they run One-Stop centers and have greater involvement in state and local WIBs).

[36]Florida is a notable exception in that state policy requires local WIBs to set aside 50 percent of their WIA funds for training (Hudis, Blakely, and Bugarin forthcoming).

comparing JTPA carryover and WIA services provided in 2000, at least two-thirds of JTPA client carryovers in the adult programs (73.6 percent) and dislocated worker programs (65.8 percent) received training services. By comparison, only about a third in either program (32.3 percent and 39.6 percent, respectively) received training under WIA (Table 3.7).

Table 3.7
Service Emphases: 2000

	Adult Program		Dislocated Worker Program	
Percentage of Exiters Who Received:	JTPA Carryovers	WIA Registrants	JTPA Carryovers	WIA Registrants
Core services only	10.1	32.6	11.4	19.4
Intensive services, no training	16.3	35.1	22.8	41.1
Training services	73.6	32.3	65.8	39.6

SOURCE: Wandner and O'Leary forthcoming. Analysis of the Workforce Investment Act Standardized Record Data (WIASRD) for 2000.

NOTE: Data are based on the 535 local areas that submitted Program Year 2000 WIASRD data.

In general, community colleges report being sent few students with ITAs. For example, in 1999, only 12 students with ITAs were referred to a California campus, although a North Carolina community college reported 170 WIA referrals (Hudis, Blakely, and Bugarin forthcoming). On the other hand, some states—including Michigan and California—report serving large numbers of potentially WIA-eligible individuals in community colleges.[37] However, these students are not referred by One-Stop centers and are not using ITAs.

► ***Several factors may to lead to greater community college participation in providing WIA services.*** Although the number of ITAs issued in the first few years since the passage of WIA has been limited, several trends are beginning to make training more of a priority. First, states have mostly completed creating the WIA infrastructure (WIBs, One-Stops centers, contracting mechanisms), making it possible for them to focus on other activities and services. Second, in some states and communities, an emphasis on "work-first" is giving way to greater balance in determining the appropriate emphasis on training (Barnow and King 2003). Finally,

[37]Based on the characteristics of recent students, about 10 percent of the for-credit participants have characteristics similar to WIA participants who might receive training services. Although this is a relatively small proportion of the postsecondary population, the absolute number is large (about half a million) (Internal NAVE analyses of NPSAS 2000).

as unemployment has risen in 2001 and 2002, making employment for the most "unemployable" more difficult, the number of ITAs issued appears to be increasing (Administrative Data Research and Evaluation (ADARE) Project 2003).

Divergent accountability systems, poor state data systems, and limited awareness among participating agencies hinder efforts to coordinate Perkins and WIA.

Accountability systems serve as the foundation for both Perkins III and WIA. Federal law stopped short of folding Perkins into WIA or explicitly aligning WIA and Perkins accountability provisions, although the intention was for states to coordinate them (see Chapter 5 for more detail on accountability under Perkins).[38]

- ***Differences in Perkins and WIA accountability measures are a disincentive for community colleges to participate in workforce systems.*** First, despite the shared emphasis on accountability and the intention to coordinate, the two laws mandated somewhat different outcome indicators; for example, WIA requires reporting of employment and earnings outcomes, while Perkins requires reporting of educational, skill attainment, and employment outcomes. Even where the indicators overlap—e.g., employment indicators—the measures states have required local programs to use for Perkins and WIA performance reporting are often different. For example, Section 136 of WIA specifies a six-month follow-up period to verify employment retention, whereas Perkins allows states to determine the follow-up period, and many states have chosen periods other than six months.[39] This lack of coordination results in an increased data collection burden for institutions that are both participating WIA providers and receive Perkins funding (Hudis, Blakely, and Bugarin forthcoming; White et al. forthcoming).

- ***Extensive recertification requirements are also a disincentive to participation.*** Most Perkins institutions were determined to be eligible training providers in the first year of WIA implementation.[40] However, in subsequent years, performance and training cost information provided by the institutions was required to determine eligibility. Many colleges claimed that the small number of WIA participants they received, juxtaposed with the costs of the additional WIA accountability recertification

[38]Dec. 17, 1998 Memo from Department of Education and Department of Labor, http://www.doleta.gov/usworkforce/documents/misc/dol-edu-memo.htm (accessed January 15, 2003).

[39]For example, for Perkins employment reporting, Massachusetts requires information nine months after leaving education, while Michigan requires information after only three months; neither requirement coincides with the WIA six-month definition.

[40]The law guaranteed eligibility as training providers to institutions eligible to receive federal funds under Title IV of the Higher Education Act of 1965. Most community colleges, the main recipients of Perkins postsecondary funds, were therefore automatically eligible.

requirements, acted as a strong disincentive to their continued participation in the workforce system support by WIA (Hudis, Blakely, and Bugarin forthcoming).[41]

- ***Many states lack adequate structures to support extensive data collection.*** Although collecting extensive accountability data can be costly, such costs are compounded in states without central data collection systems. Meeting WIA reporting requirements to provide performance data by program and campus is difficult compared to what postsecondary institutions routinely have reported in the past. Typically, community colleges in states with extensive data collection supports have been far less critical of the accountability system. Even if they had not previously been collecting the specific data elements now required, the existing data collection capacity enabled them to adapt more readily (Hudis, Blakely, and Bugarin forthcoming).

- ***Participating state agencies are generally not coordinated.*** So far, the agencies involved in workforce development continue to operate as separate entities within their state governments. Despite the fact that some states earned WIA incentive payments for adequate performance, interviews with these states revealed that their successful records were built on effective performance by individual agencies rather than any coordinated effort.[42] Agencies tend to be unaware of each other's goals, accomplishments, and performance.

In summary, early implementation of WIA has involved substantial development of workforce investment boards, One-Stop centers, and other service delivery infrastructure. Even in states where a transition to a WIA-like system took place in the early 1990s, many elements still needed to be constructed. Even where One-Stop centers and their partners were in place before WIA, it was necessary to develop eligible provider certification and recertification requirements and accountability measures consistent with the new law. Finally, developing management information systems, from scratch or by adapting existing systems, to reflect the integrated nature of the new law required a substantial effort.[43] Nonetheless, progress on all these fronts has been made (D'Amico et al. 2001).

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[41]Recertification requirements vary by state but in general involve substantial paperwork including periodic reporting, tracking, and documentation of outcomes for past participants.

[42]Under WIA, the secretary of labor awards incentive grants to those states that exceed their state-adjusted levels of performance for Title I, Title II, and Perkins III programs to promote innovative practices.

[43]To reduce the reporting burden, most states have used existing Unemployment Insurance (UI) wage data for Perkins employment information. Although UI information is not comprehensive, it represents the most reliable and least burdensome data source currently available. However, efforts to rely on UI data for Perkins performance reporting have been complicated by a recent Department of Education interpretation of the Federal Education Rights and Privacy Act (FERPA), which now limits the extent to which a student's personal information can be shared without his or her consent between state agencies overseeing higher education and the workforce development systems.

E. Outcomes and Effects

Vocational education at the postsecondary level has a fairly clear objective—to provide or improve job-related skills that enable individuals to enter the labor market, switch jobs, or advance in their current field. Policy encourages participants to complete a postsecondary program and earn a certificate, associate degree, or higher degree as a way to enhance their earnings.

A significant amount of debate surrounds the importance of attaining a credential, particularly for some participants. Some critics contend that the labor market places far less value on credentials for occupations at the sub-baccalaureate level than for occupations requiring a four-year degree, and, therefore, a policy or institutional focus on credential attainment is misplaced. They argue that even postsecondary participation in small amounts is beneficial and should be encouraged. Thus, it is important to look at who actually participates in postsecondary vocational programs and the amount of postsecondary vocational education they pursue as well as to examine their educational and earnings outcomes.

1. Attainment of a Postsecondary Credential

Federal policy has long supported the goals of postsecondary program completion and credential attainment. Federal student financial aid (Pell grants) and the TRIO programs established in the 1960s are designed to promote participants' access to and attainment of a college degree. In the case of postsecondary vocational education, that would include completion of a certificate or associate degree or transfer in order to earn a baccalaureate degree.

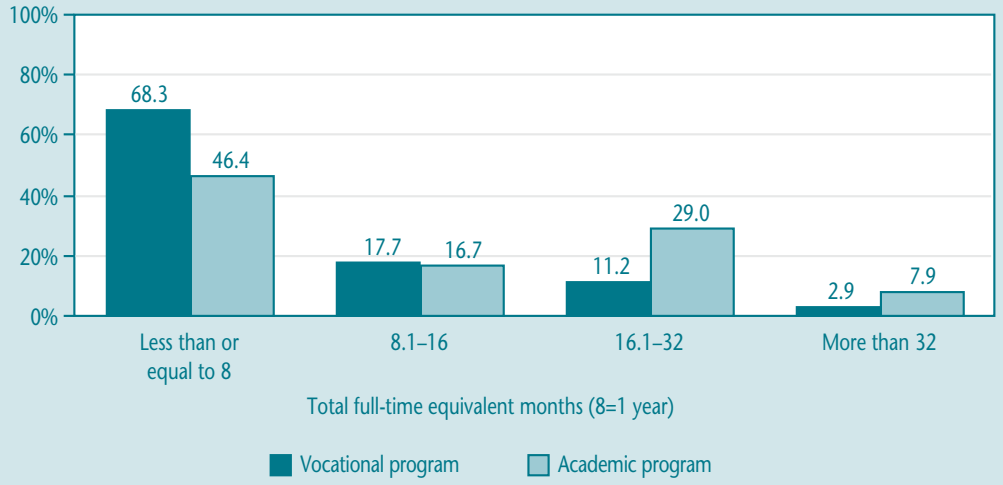
Most (69.6 percent) of postsecondary vocational students have no prior postsecondary credential of any kind and over a third are younger than age 24, with little or no previous experience in the world of work. Some have argued that these participants, in particular, are unlikely to be well-served by small amounts of course work and may benefit most from attaining a credential (Grubb 2002).

Postsecondary vocational participants have lower rates of persistence and completion than do academic participants.

Many students, both vocational and academic, leave sub-baccalaureate institutions and programs having completed few courses (Figure 3.8). However, students in vocational sub-baccalaureate programs appear to complete fewer courses than those in academic programs.

► ***Many postsecondary vocational students complete less than a year's worth of courses.*** Most postsecondary vocational students (68.3 percent) complete a year or less of courses within a five-year period, compared to 46.4 percent of academic students (Figure 3.8). Given these low rates of participation, a large share of both groups will fail to obtain any credential or to earn sufficient credits for transferring to a baccalaureate program.

Figure 3.8
Percentage Distribution of Postsecondary Students in Vocational and Academic Programs, by Amount of Participation over a Five-Year Period: 1994



SOURCE: Bailey, Alfonso, et al. forthcoming. Analysis of the Beginning Postsecondary Students Longitudinal Study, 1989–1994.
NOTE: Percentages may not add to 100.0 percent due to rounding.

► ***Less than half of vocational participants complete a credential of any kind.***[44] For example, among students who enroll in and state a goal of completing at least an associate degree, considerably fewer vocational participants than academic participants can be considered "successful" completers. Only 38.9 percent complete a credential of any kind (a quarter of which are certificates, less than their original goal), and an additional 8.0 percent transfer to earn a baccalaureate degree within five years of first enrolling. In comparison, 52.9 percent of their academic counterparts complete some credential, and an additional 8.6 percent transfer to a bacca-

[44]These findings are based on student-reported results from BPS:1989–1994. Transcript analyses of traditional-age community college students provide corroborative evidence that less than half (45.2 percent) of students earned a credential between 1992 and 2000, even after excluding those who earned less than 10 credits (Adelman 2003). Neither analyses include industry-based certifications and are thus likely to understate somewhat potential credentials attained. For example, among case study students surveyed, about 36 percent of IT students participating in an industry-based certification program (Cisco, Microsoft, or Novell) passed a certificate test after completing related courses at a two-year college (Haimson and Van Noy forthcoming).

laureate program during the same period. In addition, among those with a bachelor degree goal, vocational students are less likely to attain any credential (27.5 percent compared to 32.4 percent) and far less likely to have transferred to a baccalaureate program (19.6 percent compared to 32.6 percent) (Table 3.8).

Table 3.8

Percentage of Students according to Highest Credential Attainment within Five Years, by Program and Stated Goal: 1994

	Sub-baccalaureate Programs	
Credential	**Vocational**	**Academic**
Certificate goal, attain:		
Certificate	49.1	30.6
Associate degree	3.1	8.0
Bachelor degree	0.8	—
Any credential	53.0	38.6
Transfer to baccalaureate level	1.1	3.1
Associate goal, attain:		
Certificate	10.3	8.7
Associate degree	26.8	43.0
Bachelor degree	1.8	1.2
Any credential	38.9	52.9
Transfer to baccalaureate level	8.0	8.6
Bachelor goal, attain:		
Certificate	4.1	0.0
Associate degree	22.2	27.8
Bachelor degree	1.2	4.6
Any credential	27.5	32.4
Transfer to baccalaureate level	19.6	32.6
	Baccalaureate Programs	
Baccalaureate goal, attain:		
Certificate	1.7	
Associate degree	2.0	
Bachelor degree	58.2	

SOURCE: Bailey, Alfonso, et al. forthcoming. Analysis of the Beginning Postsecondary Students Longitudinal Study, 1989–1994.

Not surprisingly, completion rates are higher for vocational students in certificate programs than for those in associate degree programs. This pattern is largely due to the fact that certificate programs are shorter in duration than associate degree programs and generally require less rigorous academic preparation and course work. Even so, almost half (47.0 percent) of those who enroll in vocational certificate programs and state that they intend to attain a certificate still do not attain a credential within five years.

In contrast to the pattern for sub-baccalaureate students, students in baccalaureate programs are more likely to complete a credential even though the program is longer. Among those enrolled in a bachelor degree program, more than half (58.2 percent) attain that degree, 3.7 percent attain either a certificate or an associate degree, and an additional 19.1 percent are still enrolled five years later. A total of 81.0 percent are either still enrolled or have attained an academic credential.

The characteristics and goals of postsecondary vocational participants cannot fully explain their lower completion or persistence rates.

It is useful to examine the extent to which differences in the persistence and completion rates of academic and vocational majors are attributable to differences between the two populations of students. Some argue that vocational students spend less time than their academic counterparts in postsecondary education because they seek job skills rather than a longer-term education program culminating in a degree. Because credentials vary in length and difficulty, it makes the most sense to compare students who are pursuing similar credentials. It is not particularly meaningful to compare academic and vocational students among those seeking a certificate because almost all certificates are vocational. However, it is possible to analyze the gap in persistence and completion between academic and vocational students who pursue associate degrees.

As discussed in a previous section, even more so than their academic counterparts, vocational students have many characteristics that are traditionally linked to low persistence in and completion of postsecondary education (e.g., lower socioeconomic status (SES) and levels of academic preparation, more sporadic attendance, and less ambitious credential objectives). In addition, vocational students are much more likely to report wanting to upgrade their job skills as a primary reason for participating; earning a credential may not be part of their plans. The data suggest that these factors can affect the probability of completing a degree, but in many cases, the differences between academic and vocational students on these characteristics are not as substantial as many would think.

The following analyses look at the independent effect of various factors on the successful completion of educational objectives (Table 3.9). “Successful completion” is defined here

Table 3.9
Percentage Difference in Likelihood of Successful Completion[1] among Beginning Postsecondary Sub-baccalaureate Students (Pursuing Vocational vs. Academic Associate Degrees): 1994

Among Those with a Stated Goal of Pursuing an Associate Degree:[2]	Beginning Postsecondary Students[3]
Actual (unadjusted) difference in vocational-academic completion rates	-18.8*
Difference controlling for demographic characteristics	-14.6*
Difference controlling for demographic, family, and SES characteristics	-16.8*
Difference controlling for demographic, family, and SES characteristics, educational background, and attendance patterns	-10.9**
Difference controlling for demographic, family, and SES characteristics, educational background, and attendance patterns and including completion of an institutional certificate and excluding transfer in the definition of completion	-10.1*

SOURCE: Bailey, Alfonso, et al. forthcoming. Analysis of the Beginning Postsecondary Students Longitudinal Study, 1989–1994.

[1]"Successful completion" for an enrolled student with an original stated goal of completing an associate degree is defined as attaining an associate degree or higher or transferring toward completing a bachelor degree.
[2]Educational background information is limited in BPS. The National Education Longitudinal Study (NELS) provides richer prior education and better student academic achievement controls but only for a high school cohort of students.
[3]Students enrolled in sub-baccalaureate programs, Beginning Postsecondary Students Longitudinal Study (BPS) 1989–1994.

*Statistically significant at the 0.05 level.
**Statistically significant at the 0.10 level.

as completing one's stated degree objective of an associate degree or transferring into a baccalaureate program. In the main, attaining an institutional certificate is not considered "a success" because the education it requires generally falls short of the originally stated goal of an associate degree. On the other hand, a transfer is considered "a success" based on the assumption that this puts the student on a path toward a higher degree. Sensitivity testing of this definition—for example, including certificate attainment as a successful completion—suggests that, at least among the younger participants, vocational students are just as likely as their academic counterparts to attain a credential; however, they are more likely to attain a credential that requires fewer years of education than their originally stated objective (Bailey, Alfonso, et al. forthcoming).

- ***Student demographic, family, and SES characteristics:*** Vocational students are more likely to be older and in the lowest SES quartile, have a parent who has attained less than a bachelor degree, and have more family responsibilities—all characteristics, based on previous research, that are associated with lower persistence

and credential attainment. After taking these characteristics into account, however, the difference in rates of completion between vocational and academic students is largely unaffected (-16.8 percent vs. -18.8 percent) (Table 3.9).[45]

- ***Attendance patterns:*** Enrolling less than full-time and interrupting one's postsecondary education each decrease the estimated probability that sub-baccalaureate students will complete an associate degree. Less than full-time enrollment decreases the likelihood of completion (by 28.3 percent), as do interrupted enrollment and delaying enrollment for at least a year (-10.7 percent and -22.6 percent, respectively). Surprisingly, working students, even those who work more than half of the time they are enrolled, do not have a lower likelihood of completion.[46] Taking all of these attendance patterns into account reduces differences in rates of completion between students pursuing vocational and academic associate degrees by almost half (from -18.8 percent to -10.9 percent), but the difference is still statistically significant (Table 3.9).

- ***Student high school preparation:***[47] Among sub-baccalaureate participants in associate degree programs, students who pursued an academic track in high school were one-fifth to one-third more likely than those who pursued a vocational or general track to attain either a vocational or academic associate degree.[48] However, because vocational and academic sub-baccalaureate students are almost equally likely to have pursued an academic track in high school, differences in high school preparation do not affect the completion gap between vocational and academic students, at least among younger students.

- ***Student objectives:*** In the most recent NCES BPS survey (1996–98), students were asked to report their primary reason for enrolling in postsecondary education out of three possible reasons: "job skills," "degree attainment or transfer," or "personal

[45]For purposes of discussion, "successful completion" is defined as attaining an associate degree or higher or transferring for the purpose of completing a bachelor degree. Only students with an original stated goal of completing an associate degree are included in the analyses. Including transfers and excluding institutional certificates may bias completions in favor of academic students. Therefore, additional analyses were conducted and are reported below that include an institutional certificate and exclude transfer as a "success."

[46]Because the analyses control for part-time status along with amount of work, this finding indicates that if working causes students to attend part-time, then their chances of completion are reduced. However, it is the part-time status, and not their working per se, that reduces their chances.

[47]The National Education Longitudinal Study (NELS), consisting of a 1992 high school cohort of students, is used for these analyses, and these data are not shown in Table 3.9; high school information is not available in BPS.

[48]Interestingly, among those who pursue a postsecondary sub-baccalaureate program, vocational concentrators are less likely than academic students to attain an associate degree, but the reduced likelihood of future success for vocational concentrators is far less than for general track students (only 20.1 percent compared to 32.3 percent for academic students).

enrichment." As expected, students who cite "job skills" or "personal enrichment" are less likely (between -11.4 and -18.1 percent) to persist toward attaining a credential.[49] Despite the fact that vocational students are more likely to report these motivations, which might indicate that they were not seeking a degree, controlling for the reason students cite for participating in postsecondary education has no statistically significant influence on differences in persistence between academic and vocational students.

- ***Varying the definition of "successful completion":*** Including attainment of an institutional certificate and excluding transfer in the definition of "successful completion" have no statistically significant effect on differences in rates of completion between vocational and academic associate degree students. Specifically, vocational students are still 10.1 percent less likely to "complete" than academic students after considering all student characteristic adjustments (Table 3.9). However, when focusing on younger sub-baccalaureate students—those attending shortly after high school—differences in completion by major disappear. At least among younger students who state they want to earn an associate degree, vocational majors are more likely than academic majors to attain a certificate and less likely than academic majors to transfer. They are equally likely, though, to attain a credential (Bailey, Alfonso, et al. forthcoming).

Completion of a credential has long been a goal of federal policy. However, this preference is based largely on existing evidence about the importance of a bachelor degree for long-term success in the labor market. It is less clear whether a similar preference for credentials holds for sub-baccalaureate participants. In contrast to those pursuing a bachelor degree, many sub-baccalaureate students are older and already have substantial experience in the workforce. The importance the labor market places on a obtaining credential or even completing a substantial amount of course work is an empirical question that will be addressed in the next section.

Also, of potential interest is the finding that vocational students, especially younger ones, are more likely than their peers in academic programs to attain a credential that requires fewer years of education than they originally expected. Because academic students are more likely than vocational students to continue their education by transferring to a four-year institution, differences in attainment are mostly attributable to differences in transfer rates. Further analyses, however, do not attribute these differences in transferring to differences in educational aspirations. An alternative explanation may be that

[49]The "goals" question was included in surveys starting in 1996. Because these data have only three years of follow-up information, persistence rather than completion analyses were conducted. Persistence, however, is a strong predictor of completion (Tinto 1993; Horn 1996).

course work in many vocational programs, in contrast to that in academic programs, is not accepted for transfer credit.[50] It also turns out that vocational students who decide to shorten their education before attaining an associate degree may not have to leave "empty-handed": they may have earned enough credits to attain an institutional certificate. Earning a credential for completed course work short of an associate degree is simply not an option in most academic programs.

Sub-populations among postsecondary vocational participants, including those designated as "special populations," have completion rates that are similar to those of other participants.

Federal policy has encouraged the postsecondary vocational participation of students from specific groups—those who are economically and academically disadvantaged, individuals preparing for nontraditional training and employment, single parents, displaced homemakers, and individuals with other barriers to educational achievement, including limited English proficiency. Nationally representative data on some of these groups are limited, because the numbers of students with these characteristics in the population and in national surveys are small and only available for those students taking for-credit courses.[51] The educational outcomes of younger participants are also of interest to policymakers given the efforts of Tech-Prep to improve outcomes among traditional-age participants (Table 3.10).

- ***Economically disadvantaged vocational students complete at low rates but do at least as well as their academic counterparts.*** Economically disadvantaged students—vocational or academic—are less likely than economically advantaged students to complete a credential (Bailey, Alfonso, et al. forthcoming). However, this disadvantage appears to affect those in vocational and academic programs about equally; among economically disadvantaged students, the difference between those in a vocational and an academic program in their probability of completing is not statistically significant (-10.4 percent) (Table 3.10).

- ***Among academically disadvantaged students, academic and vocational students are equally likely to complete to a credential.*** As is true for economically disadvantaged students, there is little difference between academically disadvantaged

[50]However, community colleges are increasing their links with four-year institutions, and such efforts appear to be stronger than those established with local high schools (Hudis, Blakely, and Bugarin forthcoming).

[51]The national data contain insufficient numbers of limited English-proficient (LEP) and disabled students to examine the outcomes of these sub-populations. However, sample sizes in state record data are sufficient to at least look at educational outcomes of LEP students and students with disabilities, and those suggestive findings are reported. Neither national databases nor most state record systems allow analysis of displaced homemakers.

Table 3.10
Percentage Differences in Likelihood of Successful Completion,[1] by Select Sub-populations (Pursuing Vocational vs. Academic Associate Degrees): 1994 and 2000

Sub-population	Percentage Difference
Economically disadvantaged (household income less than $20,000)	6.9
Academically[2] disadvantaged	-10.4

SOURCE: Bailey, Alfonso, et al. forthcoming. Analysis of the Beginning Postsecondary Students Longitudinal Study, 1989–1994, and the National Education Longitudinal Study, 1988–2000.

[1]"Successful completion" for an enrolled student with an original stated goal of completing an associate degree is defined as attaining an associate degree or higher or transferring for the purpose of completing a bachelor degree.

[2]Detailed prior academic attainment information is available only in NELS, which follows a cohort of high school students who were scheduled to graduate high school in 1992. Students scoring in the lowest two academic test quartiles (12th-grade test) are defined as "academically disadvantaged."

students in vocational versus academic programs in their completion rates. Among students who scored in the lower half of the distribution on a 12th-grade academic achievement test, the likelihood of completion does not differ statistically between academic and vocational students (-10.4 percent) (Table 3.10).[52]

- ***Differences in completion rates for special population groups are likely to mirror overall differences between sub-baccalaureate students seeking an associate degree.*** Separate analyses for other special populations of interest are not generally possible due to the small numbers of these students in national data.[53] However, being a single parent and having disabilities have no statistically significant effect on the completion rate of sub-baccalaureate students after controlling for other differences in background and educational preparation.

2. Earnings Benefits

Increasing earnings is a primary objective for many, if not all, students who participate in postsecondary education. Past research has generally shown that postsecondary participation enhances earnings; however, the majority of this evidence is based on the benefits of having a baccalaureate degree. Very little research focuses on those students

[52]Sample size issues potentially limit these analyses.

[53]Separate analyses of LEP students are possible using state administrative records data. Analyses of LEP students are suggestive of higher completion rates among LEP students who choose a vocational rather than an academic major. Even here, though, sample sizes are relatively small.

who pursue sub-baccalaureate programs, and even fewer studies address the economic returns to vocational programs.[54] And yet, vocational programs, by their very nature, are designed to prepare students for work. Whether or not postsecondary vocational course work increases the earnings of participants beyond those of a high school graduate is potentially an important measure of the success of vocational programs.

Analyses of the economic returns to education typically require data that follow program participants over a long period of time. If education enhances labor market skills that lead to better career opportunities, the economic benefits accrue over time with both higher earnings growth and potential. Because young people, in particular, can take several years to settle into their long-term career paths, their initial earnings are not a good indicator of their earnings potential and thus the rate of return to education. Instead, to obtain a more accurate picture of the economic returns to postsecondary education, it is necessary to gather information about an individual's income many years after he or she enters the labor market. Therefore, the analysis here is restricted to graduates from the high school class of 1992.[55] Although these data cover the early years of the cohort's career path, they provide a reasonable first snapshot of the benefits of postsecondary education.[56]

Whether small amounts of postsecondary vocational course work (without attaining a credential) provide benefits depends on gender.

Because the majority of sub-baccalaureate students take relatively few courses and most do not attain a credential, it is worthwhile to examine whether more limited participation does indeed generate economic benefits (Table 3.11). These earnings returns to education were measured up to six years after a student's scheduled graduation from a two-year program. Analyses are conducted separately for male and female students because schooling and work decisions differ by gender.[57]

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[54]Kane and Rouse (1999) provide evidence about the returns to baccalaureate and sub-baccalaureate degrees. Grubb (2002) provides a comprehensive review of existing research on the economic returns to sub-baccalaureate education with and without a degree.

[55]Also, due to limitations in information about postsecondary course work in the fourth follow-up, analyses were only possible for those students who enrolled in postsecondary education within two years—by 1994. Available data do not include information about course of study for those who enrolled after 1994.

[56]Earnings analyses based on data representative of the broader population served by postsecondary sub-baccalaureate programs were conducted as well (BPS:1989–1994 and state administrative records in Texas and Florida). Findings from these analyses, though, are only suggestive because the follow-up period is shortly after students participated in postsecondary education. Earnings fluctuate the most at the early stages of one's career and thus may not be representative of earnings over a longer time period. Analyses based on the National Longitudinal Survey of Youth (NLSY) indicate that very small amounts (less than four weeks) of school-based training do not appear to benefit workers. In contrast, and not surprisingly, similar amounts of short duration company training (job and company specific) do result in an immediate wage increase (Lengermann 1996).

[57]The findings here are generally consistent with prior studies in the literature: that is, small amounts of postsecondary education provide limited economic benefits (Grubb 2002).

Table 3.11

Adjusted Percentage Difference in Earnings between Postsecondary Vocational Program Participants and High School Graduates: 1986 and 2000

	1986		2000	
Returns to:	**Male**	**Female**	**Male**	**Female**
One year of sub-baccalaureate courses	.021	.135*	.057*	.099*
	2.1%	*14.5%*	*5.9%*	*10.4%*
Vocational major	.039	.122*	.077*	.053
	4.0%	*13.0%*	*8.0%*	*5.4%*
Academic major	.004	.149*	.036	.152*
	4.1%	*16.1%*	*3.7%*	*16.4%*
Institutional certificate	.051	.228*	.063	.151*
	5.2%	*25.6%*	*6.5%*	*16.3%*
Associate degree	.115*	.387*	.158*	.365*
	12.2%	*47.3%*	*17.1%*	*44.1%*
Vocational	.121*	.373*	.264*	.385*
	12.9%	*45.2%*	*30.2%*	*47.0%*
Academic	-.107	.292	.022	.335*
	-10.1%	*33.9%*	*2.2%*	*39.8%*
Baccalaureate degree	.374*	.582*	.374*	.662*
	45.4%	*79.0%*	*45.4%*	*93.9%*

SOURCE: Bailey, Kienzel, and Marcotte forthcoming. Analysis of the National Education Longitudinal Study, 1988–2000.

*Statistically significant at the 0.05 level.

NOTE: This table presents both regression coefficients and earnings differentials. Regression coefficients are typically reported in academic journals and formal reports. However, to provide a more meaningful metric, these coefficients have been translated into the estimated difference in earnings a postsecondary student would obtain for a given amount of course work, compared to a similar high school graduate (formula: $e^{coefficient} - 1$). For example, in 2000, male students who obtained a vocational associate degree earned 30.2 percent more than a high school graduate who has similar personal and family background characteristics and work experience as indicated in the darker bar under the regression coefficients.

- ***Even without a credential, a year's worth of postsecondary credits for male vocational students now pays off.*** In 2000, male vocational students who did not attain a certificate or degree still earned 8.0 percent more per year of postsecondary education than did similar high school graduates. This finding represents a shift from 1986, when a year of courses without earning a credential provided no real eco-

nomic return for males. Perhaps newer offerings, such as IT courses, are more easily recognized and more highly valued in the current labor market than the individual courses were more than 15 years ago. In neither year did male students in academic sub-baccalaureate programs who took a year of courses but did not earn a degree do better than a high school graduate.

- ***Female vocational students who pursue a year's worth of credits without receiving a credential do not reap economic benefits.*** For female students in 2000, taking a year of course work led to earnings that were higher but not statistically different from those of female high school graduates. This finding also contrasts with the pattern 15 years ago, when course work without earning a credential did produce economic advantages. One possible reason for the change is that females enroll predominantly in health and business programs, fields in which state licensing and other credentials have become more important gateways to jobs; it is possible that it is harder now to participate in those credentialing processes without an institutional certificate. On the other hand, there appear to be large returns for females pursuing one or two years of sub-baccalaureate study in an academic field.

Those who pursue significant amounts of postsecondary education and earn a credential reap the greatest economic rewards.

Federal policy places substantial importance on attaining a postsecondary degree, in part, because of the expected economic benefits of holding that credential. However, many in the sub-baccalaureate community argue that in an environment of lifelong learning, students pursue additional education a few courses at a time, and as they can, and they may not always be seeking a formal degree or certificate. Given the potential gap between federal objectives and actual student participation, it is important to examine the relative economic benefits of earning a postsecondary vocational credential.

The evidence suggests that, for some, there are benefits to participation even if a student does not attain a credential, but those effects are relatively modest. Substantial *additional* income gains occur for those who attain a credential, bolstering the policy goal of credential attainment, at least among young participants (Table 3.11).[58] There is also evidence that the importance of a credential in the labor market may be increasing for both male and female students.

[58]The analyses include 12th-grade test scores and SES or family background variables to correct for biases due to selection. Also, a Hausman test confirmed that neither the instrumental variable (IV) nor Heckman estimates (that correct for selection bias) were significantly different from the estimates listed in Table 3.11. Also, these findings are consistent with those in the literature: that is, associate degrees provide significant economic benefits beyond those of high school diplomas, more so for those who attain the credential and more so for women than men (Grubb 2002).

- ***Female vocational students generally need a credential to benefit from their postsecondary vocational education.***[59] In 2000, female students who attained a vocational associate degree increased their earnings above and beyond female students with only a high school degree by 47.0 percent. These figures represent a significant benefit over completing the amount of course work necessary for the degree but not the credential itself—earnings of only 11.2 percent more than a high school graduate (derived by doubling the coefficient for a year of course work [.053] and using that coefficient in the following formula: $e^{.053 * 2} - 1 = 11.2$ percent).[60]

  In 2000, female students also reaped an earnings benefit over female high school graduates when they attained a certificate (16.3 percent). That benefit is higher than that of simply completing a year's worth of courses, approximately the amount needed for a certificate (5.4 percent), but the differences are not statistically significant, perhaps because of small sample sizes.[61]

  The importance of obtaining both types of credentials may be increasing. Compared to their counterparts in 1986, female vocational students in 2000 were economically much better off when they attained a certificate or associate degree than when they completed the approximate course work needed but did not get the credential.

- ***Credentials seem to matter less for male vocational students.*** Although the general pattern for male vocational students appears similar to that for females, the results are not statistically significant. Estimates suggest that the rate of return for male vocational students who attain a degree is greater (30.2 percent) than for male participants who complete two years of course work without attaining a degree (16.6 percent[62]). The earnings returns to completing a certificate also seem higher than the returns for one year of course work. However, we cannot conclude that, on average, the degree produces higher economic benefits or that the credential itself adds to earnings.

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[59]Substantial participation by females in the field of health may largely explain the heightened importance of attaining a credential for females. Many of the occupations in this field require licensing, which in turn require attainment of an educational credential.

[60]The importance of attaining an associate degree credential may be increasing for female students. In contrast to 1986, there were no earnings benefits for completing vocational course work without a credential in 2000. But in both years, there were benefits to earning the actual degree.

[61]Analyses based on state UI records in Texas and Florida indicate that individuals who attain a certificate generally do significantly increase their earnings. In addition, it is worth highlighting that the certificate credential, although typically a one-year program, includes a fairly diverse set of programs, some of which are much less than a year's worth of courses serving to dampen the average return to such a credential.

[62]To obtain the two-year coefficient, the one-year coefficient is doubled. The percentage difference in earnings is then calculated using the following formula: $e^{coefficient} - 1$.

On the other hand, the data suggest that the importance of a credential for male vocational students, as was true for female students, increased between 1986 and 2000. That is, the economic returns to a vocational associate degree more than doubled for men during that period (from 12.9 percent more than a high school graduate to 30.2 percent more). The returns to completing course work without a credential also increased, but not by as much.

Taken together, the findings indicate that there is economic value to postsecondary vocational education and that the value increases for both male and female participants as they earn more credits. The greatest earnings are obtained by those completing an associate degree, and to a lesser extent a certificate.[63] Because these findings are based on students who are among the younger sub-baccalaureate participants, additional analyses were conducted with data that include a broader cross-section of students, although there was a shorter follow-up period to examine earnings.[64] The patterns in these additional analyses are generally consistent with the findings from the younger cohort.[65]

Economic benefits are similar across the diverse populations served by postsecondary vocational education.

Current Perkins policy potentially affects all vocational programs and all of its participants. However, the effects of vocational education among special populations are of particular policy interest. In addition, separate funding for Tech-Prep (Title II of Perkins III) implies an extra policy concern for younger participants making the transition between high school and postsecondary education. The next section addresses the economic benefits for many of these sub-populations.

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[63]The rate of return for both male and female students who earn a vocational associate degree is nearly double that of completing a comparable amount of course work (two years) without attaining a credential (47.0 percent compared to 11.2 percent for females and 30.2 percent compared to 16.6 percent for males). The program or "sheepskin" effect is only statistically significant, though, for females.

[64]Such analyses, though, are limited due to their short follow-up period. BPS:1990–1994 provides information about students who pursue postsecondary sub-baccalaureate programs, over a quarter of whom were age 24 or older at the beginning of the study; however, income information is gathered at most three years after students' scheduled graduation from a two-year program; thus, the information offers very short-term estimates of the benefits to postsecondary education. State educational data records linked with UI wage information provide additional and more recent information for a population similar to the national BPS data. These data include students who enrolled in sub-baccalaureate programs beginning in 1997 and include longitudinal information through 2000; both income data prior and subsequent to their postsecondary participation are included in these analyses.

[65]According to findings from the national data, only females obtaining a vocational associate degree realize immediate gains from postsecondary sub-baccalaureate programs. Analyses based on state data, in which the sample size is larger and the data are more recent, indicate that both completers and noncompleters benefit from vocational programs. Again, though, economic benefits based on analyses using state data increase with vocational credit accumulation.

As is true for postsecondary vocational students generally, the evidence suggests that various groups of students are mostly well-served by vocational education, especially those who complete significant amounts of vocational course work (Table 3.12).

Table 3.12
Rate of Return to Participation in Postsecondary Education Compared to Completion of High School, by Special Sub-populations: 1994 and 2000

	Economically Disadvantaged		Academically Disadvantaged		Total Population	
Returns to:	**Male**	**Female**	**Male**	**Female**	**Male**	**Female**
One year of sub-baccalaureate courses	+	0	+	+	+	+
Vocational major	+	0	+	0	+	0
Academic major	+	0	0	+	0	+
Institutional certificate	+	+	0	0	0	+
Associate degree	+	0	+	+	+	+
Vocational	0	+	–	–	+	+
Academic	+	0	–	–	0	+

SOURCE: Bailey, Kienzel, and Marcotte forthcoming. Analysis of the National Education Longitudinal Study, 1988–2000 and the Beginning Postsecondary Students Longitudinal Study, 1989–1994.

+ = Statistically significant positive rate of return.
– = Statistically significant negative rate of return.
0 = No statistically significant difference.

- ***Economically disadvantaged students:*** Similar to the findings for all vocational students, students in the lowest SES quartile benefit from participating in postsecondary vocational programs. Males benefit whether they attain a credential or not. Only females who attain a credential—certificate or associate degree—have statistically significant higher earnings than their counterparts who only earn a high school diploma.

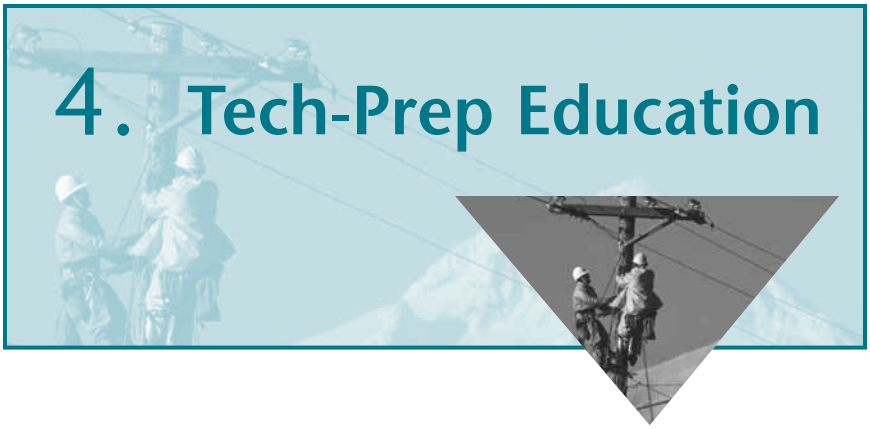
- ***Academically disadvantaged students:*** Similar to the overall findings, male, but not female, academically disadvantaged students who take a year of vocational course work increase their earnings beyond what they would earn with only a high school diploma. Both academically disadvantaged male and female students benefit from attaining an associate degree, although there are insufficient data to distinguish between the economic returns to vocational and academic associate degrees

for these students. There is also no statistically significant difference in earnings between academically disadvantaged students who obtain a certificate and those with only a high school diploma, again possibly due to the small sample size.

- ***Students from other special populations:*** The number of vocational participants in other sub-populations of interest is small, making separate analyses within these groups impossible. However, in analyses of the total population, the rate of return to vocational education is basically unchanged when these characteristics (single parent, LEP, or disability status) are taken into consideration.

- ***Younger students:*** Among students younger than age 24, vocational courses are still economically beneficial, and particularly so for those who earn a credential. Analysis of administrative records in two states suggests that earnings gains are significantly higher for those who earn a credential. In contrast, there are no statistically significant earnings gains for students who pursue sub-baccalaureate academic programs (Hoachlander et al. forthcoming).

4. Tech-Prep Education



Tech-Prep began as an effort to upgrade vocational education. Early proponents envisioned it as a structured, planned program of study that would integrate challenging academic and vocational courses and link high school studies to related, advanced technical education in two-year postsecondary programs (Parnell 1985, 1991). Their vision of Tech-Prep included a close collaboration between secondary and postsecondary institutions in developing articulated course sequences that spanned the two levels, and between academic and vocational faculty in offering applied, hands-on instruction. Students who chose to enter Tech-Prep programs would commit to taking the rigorous high school academic and vocational courses and to following the postsecondary path included in the program design.

This framework was incorporated first into Perkins II in 1990 and then, with modest changes, into Perkins III as Title II, the Tech-Prep Education Act. The initiative sought to address (1) the need for better and more technically trained workers, (2) high school students' academic deficiencies, and (3) concerns about the "neglected majority"—students in the middle half of the academic achievement distribution who had historically received little attention from policymakers, school staff, and support services. In establishing Tech-Prep as a separate title with its own funding stream, Congress clearly intended it to be different from, and potentially better than, traditional vocational education.

This chapter examines the distinct organizational structure of Tech-Prep (Section A) and addresses three questions relevant to policy:

1. What does it mean to participate in Tech-Prep and how has participation grown? (Section B)
2. To what extent is Tech-Prep implemented in ways that are consistent with the legislation and different from traditional vocational education? (Section C)
3. What evidence exists that Tech-Prep contributes to student outcomes or has benefits above and beyond those of vocational education? (Section D)

key findings ▶

▶ Key Findings ◀

▶ ***Reported participation in Tech-Prep measures diverse student experiences; thus, increases in student counts should be viewed cautiously.***

Gauging the extent to which students participate in Tech-Prep remains problematic. Although state and local definitions of a "Tech-Prep student" vary widely, the most common measure is student enrollment in a single high school vocational course for which an articulation agreement exists. In some states, Tech-Prep students are identified after they have completed high school based on their course-taking patterns, and students are unaware of having participated in a program. The number of students considered to be "in Tech-Prep" has increased significantly, partly as a result of new federal reporting requirements. The most recent estimates suggest that Tech-Prep students may represent about 10 percent all high school students, but the accuracy of these figures is uncertain.

▶ ***Access to and funding of Tech-Prep do not reflect the Perkins Act's targeting criteria.***

Schools with high proportions of students from racial or ethnic minority groups or from low-income families are less likely to offer Tech-Prep. Moreover, in contrast to the ways in which most Perkins funds are allocated, few states use a definition of poverty as a criterion in awarding Tech-Prep funds to local consortia.

▶ ***Tech-Prep is rarely implemented as a comprehensive program of study; implementation focuses on individual components of Tech-Prep, some of which are becoming more common in vocational education in general.***

Few consortia or schools implement Tech-Prep as a structured program with at least two years of clearly linked high school course work and at least two years of related postsecondary course work (the "two-plus-two" design). More typically schools implement components of the Tech-Prep model—maintaining articulation agreements, providing professional development on integration to academic or vocational teachers, and improving career guidance and planning. Many of these activities are becoming part of secondary vocational education more broadly, and little change has occurred at the postsecondary level to accommodate Tech-Prep students. As a result, Tech-Prep efforts have become less distinct from those of regular vocational education.

▶ ***Tech-Prep and non-Tech-Prep students attend college at roughly comparable rates.***

The few studies conducted on Tech-Prep indicate that students identified as program participants generally pursue postsecondary education at rates similar to or slightly higher than those of other students, whether compared to statewide or national averages or to non-Tech-Prep students. However, because no rigorous impact studies have been conducted as yet, the effects of Tech-Prep on postsecondary enrollment and completion are unknown.

A. Organization of Tech-Prep

Perkins III promotes considerable overlap between Tech-Prep and the basic state Perkins grants. The most important local institutions involved in Title II, the Tech-Prep Education Act are school districts and community colleges, the same institutions that receive funds under Title I (state grants) of Perkins. Funds under Title I can be spent on each of the components of Tech-Prep (they are "allowable activities"). The organization and administration of Tech-Prep at the local level, however, differs from that of the basic state grant. Whether this separate structure should continue or be modified is an important consideration for policymakers interested in improving Title II or the objectives it promotes.

Tech-Prep is administered at the local level by about 1,000 consortia nationwide; most are organized geographically, but some are organized by career field.

Perkins III, like its predecessor, allocates money for Tech-Prep to states and then allows them to use either a formula or competition to award grants to local consortia. These consortia are required to include at least one secondary district or area vocational school and at least one postsecondary institution, with an emphasis on two-year degree-granting institutions. A comparison of consortium counts from an earlier Tech-Prep evaluation (Hershey et al. 1998) and survey data provided by state Tech-Prep coordinators (White et al. forthcoming) suggest that some states have been increasing the number of grants awarded. Nationally, there are more than 1,000 Tech-Prep consortia (see Chapter 5).

Perkins III gives states considerable latitude in creating systems of consortia. Most often, consortia are geographic in scope, covering either established regions or counties or the service delivery area of one or more community colleges. This strategy seems to reflect the intent of the law, which is to promote greater collaboration between community colleges and their local school districts in order to improve the quality of both vocational education in secondary schools and high school students' transitions into postsecondary education.

However, evidence suggests a shift is occurring toward using statewide consortia organized around career areas. In these cases, interested schools and colleges—often not matched geographically—collaborate to update lists of skill requirements, articulation agreements, and in some cases, curricula for related sets of occupations (e.g., health or agriculture). Often schools and colleges participate in more than one Tech-Prep career consortium.

The use of geographic and statewide career-based strategies for organizing consortia appears to have both advantages and disadvantages. Statewide efforts may be more efficient than those in which each region in a state independently develops articulation

agreements in the same occupational areas. However, there is probably less focus on local collaboration in these situations, as there is when consortia consist of many school districts and postsecondary institutions in the same geographic area.

Tech-Prep consortium boundaries cover most secondary school districts and community colleges and include about half of all public high schools.

Although they vary in size both within and across states, consortia count a large number of the nation's school districts as members. According to the most recent national evaluation of Tech-Prep (Hershey et al. 1998), in the mid-1990s about 70 percent of all secondary school districts were included in at least one local consortium. Given that some consortia were still relatively early in their development at that time, it is likely that an even larger proportion of school districts are now considered members of Tech-Prep consortia. In theory, then, Tech-Prep has been introduced to at least some degree throughout the United States.

However, it is clear from national surveys as well as site visits conducted for NAVE in 2001 and 2002 that there is great variation in the extent to which districts and schools are actually aware of and involved in Tech-Prep. Only 47 percent of all high schools in 2000 reported offering something they call "Tech-Prep." Moreover, as will be discussed later, the set of activities pointed to as evidence of Tech-Prep are quite modest in many schools, and some preceded federal support for Tech-Prep.

A similar pattern seems to hold true at the postsecondary level, although there have been no national surveys of community and technical colleges about their Tech-Prep efforts. Even by 1995, consortia reported having nearly 1,400 two-year postsecondary Tech-Prep members—a figure roughly equivalent to the total number of two-year institutions of higher education in the country, most of which are public community colleges. While some community colleges are members of multiple consortia, the number suggests that many of them are at least tangentially involved in Tech-Prep. As will be discussed later, however, consortium membership does not necessarily translate into activity on postsecondary campuses that is related to Tech-Prep.

Community or technical colleges have coordinating and fiscal authority for about two-thirds of consortia.

Although most Tech-Prep activities are implemented at the secondary level (see Section C), postsecondary institutions are more likely to have responsibility for local consortium funding and structures. A review of state Tech-Prep consortium directories indicates that community colleges and other types of postsecondary institutions are the fiscal agents in more than 65 percent of consortia. These institutions most often house the individual(s)

who are the consortium staff, an expense that is paid for out of Title II funds (see Chapter 5 for more details about Tech-Prep funding). There is some evidence that federal Tech-Prep funds have helped spur community colleges to work with local secondary schools on a variety of issues including student recruitment and articulation agreements (Hudis, Blakely, and Bugarin forthcoming).

B. Access and Participation

Tech-Prep was originally conceived as an initiative to improve the academic and technical skills and workforce preparation of the "middle majority" of American high school students—those who complete high school but most likely do not earn four-year college degrees. Although the law did not specifically target this segment of the student population, its emphasis on technical occupations and on completing at least a two-year degree or apprenticeship suggests that policymakers were interested in this group.[1] More than 10 years after Tech-Prep first became a federal program, it is useful to examine how states, consortia, and schools identify Tech-Prep students and the extent to which students are involved in the program.

1. Defining and Counting Tech-Prep Participants

To document how many students actually participate in Tech-Prep, states and consortia must develop a clear definition of which students are to be considered "in Tech-Prep." Unlike participation in vocational education—which can be defined primarily by the number and type of Carnegie units students earn—participation in Tech-Prep is more difficult to pinpoint. Both the ability to define the term "Tech-Prep" and the actual definition of a "Tech-Prep participant" depend largely on how the program is implemented, which will be discussed in more detail in Section C. However, it is important to clarify the process used to report the numbers of Tech-Prep students and the challenges that underlie such reporting.

Measures of "participation" vary widely from enrollment in one course to, in rare cases, a program of study spanning high school and postsecondary education; counts, therefore, should be viewed with caution.

Although the law lays out the components of Tech-Prep and the general structure for a distinct program of integrated academic and vocational high school study linked to a related postsecondary program, states and their local consortia emphasize different ele-

[1]Because of small changes between Perkins II and Perkins III, local consortia are now encouraged to consider Tech-Prep initiatives that lead either directly or ultimately to a baccalaureate degree.

ments. As a result, Tech-Prep takes on diverse forms and creates quite varied experiences for students, as explained in more detail in Section C (Hershey et al. 1998; White et al. forthcoming; Stasz and Bodilly forthcoming; Hudis, Blakely, and Bugarin forthcoming).

Studies also confirm that there are substantial discrepancies between the kinds of Tech-Prep activities consortia and schools implement and the way they report the numbers of students who participate. For example, in some schools, implementation may focus on improving career planning, but when they try to identify "a Tech-Prep student," the schools count any student enrolled in an articulated vocational course. In other schools, Tech-Prep is ostensibly targeted to secondary vocational programs linked to programs at community colleges, but even students in programs that do not have postsecondary counterparts are included in participation tallies.

Defining Tech-Prep students at the postsecondary level is also problematic. Although many states view students as participating in a postsecondary Tech-Prep program when they are continuing an articulated vocational sequence begun at the secondary level, the students who are actually counted locally vary considerably from this description. As an extreme example, a community college participating in case studies conducted for NAVE reported in 2001 that the students in their postsecondary Tech-Prep programs ranged in age from 15 to more than 50. Both earlier and more recent studies document the lack of consistency in the way Tech-Prep students are identified for reporting within states and consortia at both the secondary and postsecondary levels (Hershey et al. 1998; White et al. forthcoming; Stasz and Bodilly forthcoming; Hudis, Blakely, and Bugarin forthcoming).

National surveys of states and consortia illustrate—but probably underestimate—the diversity of "Tech-Prep participation." To begin, about one-quarter of state Tech-Prep coordinators do not specify a definition for local consortia of who is to be counted as a secondary Tech-Prep student, and 35 percent of states do not have a definition for a postsecondary Tech-Prep student (White et al. forthcoming). Among those with state definitions to guide local reporting, there are numerous ways in which the various elements of Tech-Prep—e.g., a program students explicitly choose, planned sequences of courses that span secondary and postsecondary education, articulated courses, any vocational courses, applied academics, worksite experiences—are combined (Table 4.1). When local Tech-Prep consortia were asked a similar question in the earlier national Tech-Prep evaluation, they provided more than 30 different combinations of criteria used to define participants (Hershey et al. 1998). Only rarely does being "in Tech-Prep" reflect participation in a distinct, cohesive program of related academic and vocational course work articulated to postsecondary course sequences (Hershey et al. 1998; Stasz and Bodilly forthcoming; White et al. forthcoming).

Table 4.1
Number of States Reporting Each Criterion Must Be True for a Student to Be Defined as "in Tech-Prep"

Criteria	Number of States Indicating "Yes"
Student takes/completes one or more articulated vocational courses.	35
Student develops an individual student plan (indicating a planned course sequence across the secondary and postsecondary levels).	27
Student explicitly elects Tech-Prep as a path, major, track, or program (e.g., student signs a Tech-Prep application, chooses to be in Tech-Prep).	24
Student takes/completes one or more vocational courses whether articulated or not.	19
Student takes higher-level or College-Prep-level academic courses.	18
Student takes/completes one or more applied academic courses (e.g., principles of technology, applied communications, or those developed locally).	11
Student participates in work/training experience(s) at an employer worksite in a position related to a Tech-Prep course or career focus.	8
All vocational students are considered to be "in Tech-Prep."	4
All secondary students including College-Prep students are considered to be "in Tech-Prep."	2
All secondary students who have not chosen College-Prep are considered to be "in Tech-Prep."	1

SOURCE: White et al. forthcoming. Analysis of National Survey of State Directors of Vocational Education, 2001.

Tech-Prep participation is most often defined by enrollment in an articulated course, an increasingly common feature of vocational education in general.

Articulation plays the most important role in defining who participates in Tech-Prep. Regardless of how Tech-Prep funds are spent or the initiative is implemented in a school or consortium, participation counts are most often based on the number of students who enroll in a vocational course or program for which articulation agreements allow completers to receive advanced standing or credit at a local postsecondary institution. Among states that have defined participation and responded to a national survey, the vast majority (35 of 42, or 83 percent) report that enrollment in at least one articulated vocational course is a necessary criterion for a student to be considered "in Tech-Prep"

(Table 4.1). Site visits confirm the frequency with which articulated courses are used to identify Tech-Prep participants (White et al. forthcoming; Stasz and Bodilly forthcoming).

By relying on counts of students in articulated courses, however, it is becoming more difficult to differentiate participants in Tech-Prep from participants in vocational education in general. Since Tech-Prep was first established as a federal program, articulation agreements have been developed for an increasing share of secondary vocational courses and programs (see Section C). Because of the substantial coverage of articulation agreements and the inability of many administrative systems to separate enrollments in articulated vocational courses from enrollments in nonarticulated ones, Tech-Prep participation—in fact and as reflected in student counts—is increasingly similar to participation in regular vocational education courses and sequences.

Many consortia and their members have difficulty reporting counts of Tech-Prep students.

Even using their own locally established definitions of Tech-Prep participation, consortia and schools face challenges in reporting the numbers of participants. Based on surveys of local consortia, only 36 percent of Tech-Prep consortia nationwide could report counts of participants in 1993, and they could do so for only 17 percent of the secondary districts they identified as consortium members (Hershey et al. 1998). The same evaluation indicates that in 1995, 65 percent of all consortia reported counts, but only 42 percent of their districts did so. While no comparable surveys of consortia were conducted after 1995, eight states did not report any counts of Tech-Prep participants to the Department of Education (ED) in 2000, and four states did not do so in 2001. Moreover, site visits conducted for NAVE suggest that many state reports in 2000 and 2001 could not cover all of their Tech-Prep consortia or the districts and schools that are considered consortium members (White et al. forthcoming).

The difficulty faced by consortia and schools in reporting Tech-Prep counts can be traced to practical constraints as well as the nature of implementation. As noted above, secondary school records often are not organized or electronically coded in a way that allows ready identification of students in particular vocational courses or a combination of vocational and "applied" academic courses (Hershey et al. 1998). Tracking students as they progress from the secondary to postsecondary levels of Tech-Prep is particularly problematic (White et al. forthcoming; Hudis, Blakely, and Bugarin forthcoming). Because Tech-Prep is rarely a distinct program that students apply for, schools cannot rely on application or registration forms to provide them with counts of participants. In cases in which Tech-Prep is considered more of a process than a program, for example, a strategy for keeping articulation agreements up-to-date, introducing new vocational

courses, and improving career guidance, consortia will continue to struggle to define which students are actually "in Tech-Prep" and to count them. These challenges raise questions not only about the quality of data reporting to ED but also about defining the nature of Tech-Prep and the ability of state and local officials to monitor its progress.

2. Trends in Participation

Despite the difficulties in counting the number of students who participate in Tech-Prep, states are required to do so under Perkins III and to report those numbers to the U.S. Department of Education. Because definitions and counting methods have changed over time, trends in participation should be viewed with caution.

Reported high school participation in Tech-Prep seems to have increased since the early 1990s.

According to state and local consortia, students' exposure to Tech-Prep has expanded since its inception in the 1990 Perkins Act. The number of high school students identified by consortia as "in Tech-Prep" grew from about 173,000 in 1993 to almost 740,000 in 1995 (Hershey et al. 1998). The most recent estimates, provided by officials in 48 states in their annual reporting to ED, indicate that about 1,260,000 high school students participated in Tech-Prep in 2001 (Table 4.2).

Table 4.2
Total Number of Secondary Tech-Prep Students Reported and Percentage of Students as a Share of All High School Students: 1993, 1995, and 2001

	1993	1995	2001
Total number of secondary Tech-Prep students reported (rounded)	173,000	740,000	1,260,000
Percentage of Tech-Prep students as a share of all U.S. high school students (grades 9–12)	1.5%	6.1%	9.4%
Percentage of Tech-Prep students as a share of high school students in districts reporting counts of students	2–5%	6–8%	n/a

SOURCE: 1993 and 1995 data come from surveys of local consortia conducted under the National Tech-Prep Evaluation (Hershey et al. 1998); 2001 data come from annual state reports to ED. To calculate Tech-Prep participation as a share of all high school students, secondary (grades 9–12) enrollment data were drawn from: http://nces.ed.gov/pubs2002/digest2001/tables/dt056.asp.

n/a = not available or missing data.

NOTE: Including District of Columbia, Puerto Rico, and the Virgin Islands as states, nonresponse was 10 states in 1993, 1 state in 1995, and 4 states in 2001.

As reported, about 10 percent of high school students participate in Tech-Prep.

Although the scale of Tech-Prep participation has grown, this initiative still does not reach the middle majority of high school students, a goal some early advocates promoted. Based on data provided by states in FY 2001, Tech-Prep students represented about 10 percent of all secondary students in grades 9–12 that year.[2] That share has increased along with the numbers of participants since 1993 (Table 4.2). However, there is great variation in rates of participation across states. For example, a state evaluation of Kentucky's Tech-Prep initiative found that in FY 1997, Tech-Prep participants represented approximately one-third of the students enrolled in schools offering Tech-Prep.[3]

Not surprisingly, the share of Tech-Prep students at the postsecondary level, as defined by each state, is smaller than that at the secondary level. Relative to the numbers of students reported to be enrolled nationally in postsecondary education and training, 1.7 percent are postsecondary Tech-Prep participants, based on state reports.[4] If all of the Tech-Prep students attend two-year institutions, as the Perkins Act appears to promote, then the reported number of postsecondary Tech-Prep participants would represent 4.6 percent of total enrollments at those institutions.

3. Access to Tech-Prep

In part because policymakers viewed Tech-Prep as an initiative that was distinct from and improved upon vocational education, they established not only a separate title for Tech-Prep but also special provisions to promote its availability to all students. For example, in defining the contents of a Tech-Prep program, Section 204 (6) of Title II specifies that each program ". . . provide equal access, to the full range of technical preparation programs to individuals who are members of special populations. . . ." Recent national data provide an indication of the extent to which some kind of Tech-Prep effort is available in different types of schools.

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[2]The 9.4 percent figure should be considered a lower-bound estimate of the share of high school students in Tech-Prep because it assumes that the states that did not report counts of Tech-Prep participants, in fact, did not have any. For the purposes of this report, the estimate is 11.1 percent if one makes the generous assumption that the eight states that did not report on participation had students involved in Tech-Prep at rates comparable to those in other states but simply were unable to collect the data.

[3]As another way to think about the scale of Tech-Prep, according to state-reported data, in 2001 Tech-Prep students represented about 20 percent of all secondary vocational education participants. These figures appear to suggest that Tech-Prep is a selective program, but case studies indicate that the small numbers of Tech-Prep students are more likely to be the result of low levels of implementation and reporting in consortium districts and schools.

[4]Denominator is from Snyder et al. 1999, p. 200, Table 173.

Tech-Prep is less likely to be offered in "disadvantaged" secondary schools than in other schools.

Secondary schools that are considered to be "disadvantaged"—those with high proportions of students who live in poverty, who are from a racial or ethnic minority group, or who have disabilities—are less likely than most other schools to provide offerings they call "Tech-Prep" (Table 4.3). However, the proportion of highly disadvantaged schools offering Tech-Prep is similar to that of highly advantaged schools doing so. The reasons why Tech-Prep is less common in both types of schools probably differ, though. One hypothesis is that highly advantaged schools, with very low levels of students living in poverty and from special population groups, likely send most of their students to four-year colleges and focus their curricula on preparation for that goal; thus, these schools may simply choose not to participate in Tech-Prep. Highly disadvantaged schools, on the other hand, may be less likely to offer Tech-Prep because of constrained resources or other educational priorities.

This pattern is not surprising, given the way states allocate funds to local consortia, as will be discussed in more detail in Chapter 5. Unlike the legislated formula that guides how Perkins basic state grants are distributed to districts and postsecondary institutions, few states consider school or community poverty levels in determining whether a Tech-Prep consortium receives a grant and how much it receives (White et al. forthcoming). Similarly, students' race, ethnicity, and disability status are not factors that are considered in competitive or formula awards made by states to local consortia.

Tech-Prep is somewhat less available in urban schools than in schools in other types of communities.

Tech-Prep activity is about as likely to be offered in suburban as in rural schools but less likely to be offered in urban schools, based on the 1999–2000 Schools and Staffing Survey (Table 4.3). The results in 2000 appear to differ from those of the earlier national Tech-Prep evaluation; that evaluation found that in the mid-1990s Tech-Prep grants were distributed relatively evenly across types of locale (Silverberg, Hulsey, and Hershey 1997), as required by a provision (Title II, Section 205(e)) that states ensure the "equitable distribution of assistance between urban and rural consortium participants." Such results are not necessarily inconsistent: consortium grants may be awarded equitably by urbanicity, but the allocation of funds within a consortium—to individual schools—may differ between those in urban and those in suburban or rural areas.

Table 4.3

Percentage of High Schools Offering Tech-Prep, by School Characteristics: 2000

School Characteristics	Percentage Offering Tech-Prep
All	
Income/poverty (percentage of students eligible for free or reduced-price lunches)	
Less than 5%	41.1*
5–25%	52.7
25–50%	49.4
More than 50%	41.0*
Minority status (percentage of students of color)	
Less than 5%	49.9
5–50%	48.3
More than 50%	41.5*
Special needs status (percentage of students with disabilities)	
Less than 5%	27.2*
5–10%	52.3
11–15%	52.1
More than 15%	41.6*
Urbanicity	
Urban	44.1*
Suburban	48.7
Rural	48.7
Region	
Northeast	43.6*
Midwest	48.2
South	55.2
West	35.7*
School size (number of students enrolled)	
1–150	16.9*
151–499	48.5
500–749	59.2
750 or more	61.8*

SOURCE: Levesque 2003d. Analysis of school data from the 1999–2000 Schools and Staffing Survey.

*Statistically significant difference between marked category and middle category or categories.

C. Implementation

The definition and contents of Tech-Prep are specified in Title II of Perkins III (Sections 202, 204, and 205) and include activities that students are to engage in, outcomes they are to attain, and processes to support consortium and student activities. To a large extent, these components overlap with those promoted in Title I to help improve vocational education in general.

According to Title II (Section 202), a Tech-Prep program is *a program of study that*

(A) combines at a minimum two years of secondary education (as determined under state law) with a minimum of two years of postsecondary education in a nonduplicative, sequential course of study;

(B) integrates academic, and vocational and technical, instruction, and utilizes work-based and worksite learning where appropriate and available;

(C) provides technical preparation in a career field such as engineering technology, applied science, a mechanical, industrial, or practical art or trade, agriculture, health occupations, business, or applied economics;

(D) builds student competence in mathematics, science, reading, writing, communications, economics, and workplace skills through applied contextual academics, and integrated instruction, in a coherent sequence of courses;

(E) leads to an associate or baccalaureate degree or a postsecondary certificate in a specific career field;

(F) leads to placement in appropriate employment or to further education.

Perhaps most importantly, Title II requires that a Tech-Prep program ". . . be carried out under an articulation agreement between the participants in the consortium" (Section 204). All of these program features are expected to be part of Tech-Prep implementation.

Articulation agreements remain the cornerstone of Tech-Prep.

The law describes the aim of Tech-Prep articulation as providing students with a "nonduplicative sequence of progressive achievement" across high school and postsecondary education, leading to a degree or certificate (Section 202). As described in Chapter 2, articulation typically involves aligning the content of a particular high school course with a similar community college course or aligning a series of courses that link a high school program to a college program. Articulation agreements formalize this process and are intended to help students make the transition from secondary to postsecondary institutions by eliminating redundancies in course work and providing them with opportunities to earn college credit or advanced standing in postsecondary programs for skills acquired in high school.

While Title II of Perkins promoted several practices in its vision of Tech-Prep, articulation is the most common and tangible component of Tech-Prep implementation. Site visits indicate that while some secondary schools may also pursue integrated or applied academic curricula, enhanced career guidance, or worksite experiences under the Tech-Prep banner, most school officials and vocational educators point to the establishment and updating of articulation agreements when asked to describe their Tech-Prep initiatives (Stasz and Bodilly forthcoming; Hudis, Blakely, and Bugarin forthcoming; White et al. forthcoming). State Web sites also highlight the prominent role articulation plays in Tech-Prep (see http://www.natpl.org). Most of these Web sites provide lists of and links to articulation agreements between each participating secondary school and local college, addressing to some extent a concern about the lack of promotion of articulation options first raised in the earlier national Tech-Prep evaluation (Hershey et al. 1998, p. 66).

National surveys also underscore the prevalence of articulation agreements. Among secondary vocational teachers, 41.1 percent worked with postsecondary faculty on articulation agreements at least once during the 2000–2001 school year, and more than one-third had a class for which an articulation agreement exists (Table 4.4). In contrast, only about 5 percent of academic teachers had a class for which an articulation agreement exists.[5] Among vocational teachers who participated in a Tech-Prep, career academy, or other special career-focused program, 43 percent had articulated classes. The proportion of vocational teachers involved in articulation far exceeds that involved in other components promoted by Tech-Prep, as described below.

Table 4.4
Percentage of Vocational Teachers Involved in Articulation: 2001

Measure of Articulation	Percentage of Vocational Teachers
Worked with postsecondary faculty on articulation agreements	41.1
Had class with articulation agreement that grants students advanced standing or credit at a local community or technical college	34.3

SOURCE: Stasz and Bodilly forthcoming. Analysis of High School Study: 2001 National Teacher Survey.

[5]Figures on the percentage of vocational and academic teachers with classes that have articulation agreements are likely to underestimate those with at least one class that has been articulated. In a survey conducted for NAVE (see Stasz and Bodilly forthcoming), teachers were asked to report on the characteristics of the first class held on the day the survey was administered; if more advanced vocational classes—those more likely to be articulated—were offered later in the day, then this survey approach would have resulted in a systematic undercount.

Despite the emphasis on articulation over the past decade, implementation of this core Tech-Prep feature has not had the anticipated impact, for several reasons:

- ***Emphasis has been on course-to-course articulation rather than on program articulation.*** Some of the expected benefits of articulation were predicated on linking a comprehensive high school program of study—including a sequence of challenging vocational or technical courses and academic courses—to a related program at the postsecondary level. The advantage of program-to-program articulation over course-to-course articulation is that it underscores the importance of taking appropriate academic classes and achieving the academic skills necessary to succeed in the postsecondary program. However, this form of articulation is rare; most articulation agreements specify college credits to be earned for taking a specific vocational course in high school (review of state Tech-Prep Web sites; Hershey et al. 1998).[6]

- ***Despite having the opportunity, relatively few Tech-Prep students receive articulated college credit.*** While a majority of Tech-Prep students do pursue college, most of them do not appear to take advantage of the option of earning articulated postsecondary credit for high school course work (Hudis, Blakely, and Bugarin forthcoming; Hershey et al. 1998). There are many explanations for the fact that a small proportion of Tech-Prep students earn articulated credit—estimates have shown that only 15 percent of Tech-Prep students do so (Hershey et al. 1998). Some such reasons may include (1) procedural hurdles, such as waiting lists to get into high-demand postsecondary programs or having to apply or take an exam on a college campus to be granted the credit;[7] (2) the diverse interests and paths of high school Tech-Prep students, which may or may not include a two-year postsecondary program at the specific community college or colleges to which their secondary vocational courses have been articulated; and (3) students' concerns about their mastery of skills or desire to make their first-year college workloads easier by repeating instruction already taken in high school (Hershey et al. 1998).

- ***Inadequate data systems limit the tracking of Tech-Prep students into postsecondary partner institutions.*** Consortia and states have faced a variety of challenges in trying to identify Tech-Prep students who have matriculated in postsecondary

[6]Occasionally, two high school vocational courses must be completed in order to earn equivalent credit for a single postsecondary course.

[7]In some states and communities (e.g., Ohio), articulated credit can only be awarded if a student pursues a postsecondary program that is similar to the vocational course work taken in high school, based on the assumption that only these students are truly continuing in Tech-Prep. In other states and localities, students can earn postsecondary credit even if their postsecondary program is unrelated to the occupational focus of their high school course work.

institutions and are eligible for articulated credit. Most states do not have secondary and postsecondary data systems in which Tech-Prep students are flagged or that can pass information back and forth.

While the number of students earning articulated credit may be relatively small, articulation efforts have had some important benefits, including (1) stimulating communication between secondary and postsecondary vocational faculty and (2) improving the rigor and consistency of some secondary vocational curricula, by encouraging high schools to adopt college curricula and instructional materials as proof of course equivalency (Hershey et al. 1998).

Tech-Prep articulation is expanding beyond preparing students for technical careers.

Tech-Prep, particularly its articulation component, has come to encompass a broader set of careers and occupations than those specified in the law. While early proponents and members of Congress focused on increasing the number of well-trained technical workers, state and local officials have tended to view Tech-Prep as a reform relevant for all vocational education. These officials have not wanted to withhold the potential benefits of articulation agreements from students interested in less technical occupational programs or who might be seeking careers outside those traditionally associated with vocational education.

As a result, consortia in virtually every state have established Tech-Prep articulation agreements in such areas as child care, hospitality, interior or fashion design, and criminal justice (see http://www.natpl.org). Even in 1995, 32 percent of consortia offered Tech-Prep activities in the arts and humanities career area, and this type of offering appeared to be growing at that time (Silverberg, Hulsey, and Hershey 1997). By 2001, only a few states, such as Ohio, appeared to focus Tech-Prep and articulation efforts only on program areas that prepare students for high-tech occupations offering high wages.

Interest in applied academics is mostly weakening, although enthusiasm for other forms of curriculum integration continues.

Most other practices promoted in the Tech-Prep Education Act (Title II) have received less attention than articulation in the past several years. In particular, a form of integration referred to as "applied academics" (component (D) as defined in the law) was intended to "build student competence in mathematics, science, reading, writing, communications, economics, and workplace skills."

State and consortium officials have greatly endorsed that ideal, but their early enthusiasm for this aspect of Tech-Prep has waned somewhat. The earlier national evaluation

found that "off-the-shelf" applied curriculum packages were being replaced by efforts to develop applied lessons or units locally, a shift reflecting the expense of the packaged curricula and a rejection of earlier efforts to designate certain classes as "applied" because of the stigma attached to those classes. On the other hand, some states (e.g., Mississippi and Nebraska) continue to promote and support implementing these courses as one way to achieve the applied academic objectives of Tech-Prep. In addition, North Carolina is developing its own set of applied science courses for Tech-Prep students, in which students will ideally be grouped by the occupational focus of their studies.

Tech-Prep efforts to encourage academic teachers to develop and adopt applied approaches in traditional courses received support from the School-to-Work Opportunities Act, but implementation of these efforts has not been widespread (Hershey et al. 1998). In many states, the pressures of state academic standards and high school exit exams have made it more difficult to promote these approaches, particularly when little is known about their effectiveness. In 2001, only 11 state Tech-Prep officials reported that taking an applied academic class—with a commercial or locally developed curriculum—is necessary for a student to be classified as "in Tech-Prep" (see Table 4.1). Site visits conducted for NAVE in 12 states found little evidence that this form of Tech-Prep integration was being emphasized at the local level (Stasz and Bodilly forthcoming; White et al. forthcoming).

Instead of attempting to modify the content or delivery of academic course work, some states and localities have moved toward encouraging or requiring Tech-Prep students to meet certain academic course-taking standards (in addition to being enrolled in a vocational course sequence). For example, in North Carolina, Tech-Prep students must take college-preparatory mathematics, and in Florida, a student cannot be considered as "in Tech-Prep" unless that student is at grade level or above by the junior year in mathematics, science, and communications (Stasz and Bodilly forthcoming). This approach relies on the traditional academic course offerings at local schools in which Tech-Prep and other students are combined.

Tech-Prep officials also generally support other forms of integration, including strengthening the academic content of vocational courses, but they have not typically led these efforts in the last several years. Certainly, in some schools where Tech-Prep has been implemented as a separate, specialized program for interested students—such as in the Medical Laboratory Technology Program, a joint initiative of the New York City Board of Education and the City University of New York (College of Staten Island)—vocational curricula have been revised to emphasize the science, math, or reading and writing skills necessary to be successful in certain targeted careers (Shimony et al. 2002). However, in most states and communities, Tech-Prep is largely built around existing vocational courses that serve all vocational students, whether or not they are in Tech-Prep, and

efforts to integrate more challenging academic content in vocational curricula have been broad and not directed at Tech-Prep specifically.

Worksite experiences are not a focus of recent Tech-Prep efforts.

Following the emphasis in the School-to-Work Opportunities Act of 1994, Perkins III encourages Tech-Prep initiatives to include worksite learning as appropriate. According to consortia reports, the number of Tech-Prep students who had paid school-year jobs related to their vocational studies grew from just over 9,000 in 1994 to more than 25,000 in 1995, representing close to 6 percent of all reported Tech-Prep students both years (Hershey et al. 1998). About 14 percent of Tech-Prep students in both years participated in work site visits. However, consortium members indicated that most of the workplace experiences in which Tech-Prep students engaged were available to all students in their schools rather than targeted specifically to Tech-Prep students.

As state and local grants under the School-to-Work Opportunities Act began to sunset around the year 2000, resources for and attention to this component have dwindled somewhat. Site visits to local consortia staff, secondary schools, and postsecondary institutions suggest that worksite experiences are not a priority for Tech-Prep in most communities (Stasz and Bodilly forthcoming; White et al. forthcoming; Hudis, Blakely, and Bugarin forthcoming).[8] By 2001, 24 states (about half) reported work-based learning as a key Tech-Prep element, but only eight states (19 percent) required that a student be involved in a workplace experience to be counted as a Tech-Prep participant (Table 4.5).

Table 4.5
Number of States Specifying Workplace Experiences as a Key Tech-Prep Element

State Guidance	Number of States
State specifies that local consortia include work-based learning as a component of Tech-Prep.	24
State definition of a Tech-Prep student includes "student participates in work/training experiences at an employer worksite in a position related to a Tech-Prep course or career focus."	8

SOURCE: White et al. forthcoming. Analysis of National Survey of State Directors of Vocational Education, 2001.

[8]However, prominent programs certainly remain in which internships or summer work are integral to the Tech-Prep experience, such as the Boeing Tech-Prep program in Seattle and the UPS programs in Kentucky.

Few consortia or schools implement Tech-Prep as a comprehensive program of study.

Tech-Prep, as prescribed in Perkins III, appears to encourage a set of structured programs that combine the different elements outlined in the law for those students who choose to participate. The students would commit to a program's career focus and expected outcomes and would follow a well-defined sequence of both academic and vocational courses specifically designed to prepare them for eventual employment in that career field after completing a relevant associate's degree. To integrate academic and vocational instruction, each program would cluster its participants together in many if not most classes. The Tech-Prep program would identify the particular program(s) at the postsecondary level in which students are expected to continue, and articulation agreements would link the high school vocational and academic components to the postsecondary component.

If Tech-Prep merits being distinguished from other educational programs, its value lies in these coherent, structured programs of study that early proponents advocated. Case studies suggest that this model has benefits that set it apart from the more diffuse approaches to Tech-Prep implementation (Hershey et al. 1998). When students are actually required to participate in and commit to a sequence of academic and vocational courses that prepare them for a career, it is possible to set high standards for achievement. Comprehensive programs of study typically involve high school and college educators working closely together, which allows the kind of communication between teachers and students that can enhance students' transition into the postsecondary stage of the program. These programs are often conceived and planned with strong support from employers, a collaboration that can strengthen the public image of a program. Clustering students in academic and vocational classes not only offers opportunities for the kind of integration that is most likely to improve their learning of rigorous theoretical concepts but also can also produce a sense of identity, pride, and seriousness of purpose among these students.

However, both the earlier national Tech-Prep evaluation and more recent studies conducted for NAVE indicate that this structured form of Tech-Prep is rarely found in U.S. high schools (Hershey et al. 1998; Stasz and Bodilly forthcoming; White et al. forthcoming). When last evaluated in a systematic manner, the results showed that only about 10 percent of consortia, representing 5 percent of all Tech-Prep participants reported (less than 1 percent of high school students overall), promoted this model (Hershey et al. 1998). Over the years, states, consortia, and schools have pursued diverse implementation strategies emphasizing and combining the individual elements of Tech-Prep to varying degrees, but infrequently have they used all of them together. In 2001, only about a quarter of states reported that they promote Tech-Prep as a distinct program to

local consortia (Table 4.6). Even within those states, local consortia and schools are often inconsistent in how strictly they adhere to this vision (Stasz and Bodilly forthcoming).

According to Tech-Prep officials and educators, several factors affect the relative lack of support for distinct programs of integrated academic and vocational study (Hershey et al. 1998):

- Some parents and educators are concerned that choosing a high school program of study organized around a career interest might limit students' chances of pursuing another career in the future.[9] This is consistent with the movement in high school vocational course taking in general (described in Chapter 2) toward more exploration and less concentration in a single career area.

- Most parents, even those of students with weak academic performance, want their children to go to a four-year college, and Tech-Prep's focus on students' transitions to community college is thought to undermine their prospects for earning a bachelor's degree.

- Programs associated with vocational education, even those that emphasize high-skill, high-tech occupations, still evoke suspicions of tracking in some cases; grouping students by their academic and vocational courses can exacerbate this problem.

- Some schools are too small to group Tech-Prep students in academic courses by career program area or to tailor academic courses to a career focus.

- Educators acknowledge that students in vocational courses classified as Tech-Prep have diverse interests and abilities that lead them in many directions in terms of postsecondary study; as a result, participating faculty have been reluctant to emphasize one particular college program (the articulated path) over others.

- Because comprehensive programs involve more intensive efforts and resources, those that are offered include small numbers of students. For example, the comprehensive Med-Tech Tech-Prep program is offered in two Staten Island high schools, and the number of juniors who enrolled between 1994 and 1998 was just 265, or about 66 students each year (Shimony et al. 2002), representing about 4 percent of the juniors in those two schools.

[9]On the other hand, career academies—usually implemented as career-focused programs of study in which students are grouped in key academic and vocational courses—have grown in popularity (Kemple 2001).

Table 4.6

Number of States Reporting Specific Approaches Must Be Used by Local Tech-Prep Consortia at the Secondary and Postsecondary Levels: 1997 and 2001

	Secondary		Postsecondary	
Approach or Definition	1997	2001	1997	2001
Definition of who is to be counted as a Tech-Prep student	35	35	28	30
Features of secondary/postsecondary articulation agreements	31	30	32	30
Requirements for a database/tracking system containing information on individual Tech-Prep students	21	27	18	26
Criteria for assessing overall program performance	25	27	24	24
Involvement of program-level business advisory groups	25	26	23	21
The target population for Tech-Prep	31	25	32	15
Inclusion of work-based learning components	29	24	26	17
Development or adoption of occupational skill standards	19	23	19	17
Credential/degree objectives for Tech-Prep participants	26	21	24	24
Curriculum development objectives	25	20	20	15
Approaches to career guidance	26	20	20	10
Strategies for marketing Tech-Prep	n/a	18	n/a	15
Membership on local Tech-Prep policy committees	n/a	18	n/a	17
Methods to facilitate access for special populations	18	16	17	11
Type and/or amount of professional development	20	16	16	12
Points at which students make decisions, such as choosing career clusters/specialties	21	14	12	6
Use of particular approaches to certifying attainment of skills (e.g., certificates of competency or "portable credentials")	n/a	14	n/a	12
Implementation of Tech-Prep as a distinct program	n/a	13	n/a	7
Involvement of four-year postsecondary institutions	n/a	13	n/a	16
Use of commercial applied academic curricula	n/a	7	n/a	5
None of the above has been prescribed	n/a	4	n/a	3

SOURCE: Hershey et al. 1998. Analysis of the Survey of State Tech-Prep Coordinators, 1997. White et al. forthcoming. Analysis of National Survey of State Directors of Vocational Education, 2001.

n/a = not available or missing data.

For these and perhaps other reasons, consortia and schools have turned to less structured, programmatic approaches to Tech-Prep (Stasz and Bodilly forthcoming; Hershey et al. 1998). One common approach is an enhanced version of career guidance, in which schools develop course sequence guides, charts that display the available academic and vocational courses recommended as preparation for particular career areas and, sometimes, the types of postsecondary education or training appropriate for each of those paths. The academic courses are those traditionally offered by the schools and required for graduation. Vocational courses that have been articulated may be identified as such. Guidance counselors then use these course sequences to help students choose their electives in ways that support students' career interests and postsecondary plans.

In other versions, implementation focuses on individual elements of Tech-Prep—maintaining articulation agreements, supporting applied academic courses, providing professional development to academic or vocational teachers—but rarely are these elements connected or do they involve the same sets of students.

Although community and technical colleges play a lead role in consortia, Tech-Prep is largely viewed as an effort to upgrade secondary vocational education; it has little impact on postsecondary courses.

Postsecondary partners appear to play supportive roles in Tech-Prep, particularly through consortium leadership, but there is less Tech-Prep activity on college campuses or perception of a need to change than in high schools and area vocational centers (Hudis, Blakely, and Bugarin forthcoming; White et al. forthcoming; Hershey et al. 1998). While under Tech-Prep, secondary schools may need to modify and update vocational curricula to satisfy articulation arrangements or make other changes consistent with their Tech-Prep objectives, typically Tech-Prep has little impact on college curricula and services. Relatively few postsecondary institutions have offered new courses for students entering with Tech-Prep experience or made other modifications that can be traced directly to the implementation of Tech-Prep.[10]

In fact, surveys of state Tech-Prep coordinators suggest that states were providing less guidance to local consortia about postsecondary Tech-Prep in 2001 than they had done in 1997 (see Table 4.6). Fewer states in 2001 than in 1997 reported specifying for consortia such features as the development or adoption of occupational skill standards for postsecondary Tech-Prep programs (17 vs. 19), curriculum development objectives (15 vs. 20), career guidance approaches (10 vs. 20), or types and amounts of Tech-Prep professional development (12 vs. 16).

[10]A number of institutions, however, do offer courses to Tech-Prep administrators or faculty interested in learning about the Tech-Prep concept.

The more limited Tech-Prep activity of postsecondary partners appears to be a result of several factors. First, in most states, a relatively small number of students on community college campuses can be documented as having "completed a secondary Tech-Prep experience." At the same time, many community colleges serve a predominantly older student population. These two trends have provided little incentive for colleges to make substantial modifications to curricula or other changes to address the particular needs of Tech-Prep students. In addition, community college offerings are driven by such external factors as the economy and local business needs. Local employers may or may not push to have Tech-Prep applied to the postsecondary level, which may involve implementing applied academics or related worksite activities that could lead to major alterations in postsecondary education.

D. Outcomes and Effects

According to both its advocates and Perkins III legislation, Tech-Prep is intended to offer several benefits. First, in a general sense, the implementation of Tech-Prep should result in higher numbers of students entering technical postsecondary study. Second, participation in Tech-Prep should "build competence in" or improve students' academic and technical skills. Third, Tech-Prep is expected to raise the probability that a student attains an associate's degree, certificate, or baccalaureate degree in a field related to his or her secondary program of study. Finally, articulation agreements and "nonduplicative, sequential courses of study" should allow Tech-Prep students to either complete postsecondary programs more quickly or complete them with higher skills because they entered with advanced standing, which would, in turn, result in higher earnings.

These expected outcomes, however, were predicated on the notion of Tech-Prep as a coherent program of related academic and vocational study that spanned both the secondary and postsecondary levels. At least as implemented in most communities, Tech-Prep does not appear to follow this model or reflect a consistent program with a core set of features; it is instead a varied set of practices that are generally available to students in regular vocational education courses.

In part because of its diverse implementation, no rigorous evaluation of the effects of Tech-Prep nationally has been conducted. The earlier national Tech-Prep evaluation documented the outcomes of students considered to be "in Tech-Prep," as reported by all local consortia, and collected transcript and survey data on Tech-Prep students in 10 consortia. Evaluations of Tech-Prep students in several states (Ohio, New York, Texas, Florida, and Kentucky) and one study of eight "mature" Tech-Prep consortia have been carried out. A few evaluations of individual local Tech-Prep programs—those with more comprehensive programs of study—have also been conducted.

All of these evaluations have methodological limitations that preclude making judgments about the impact of Tech-Prep—that is, the extent to which the program leads to better or different outcomes than students would have achieved without participating in Tech-Prep.[11] Still, some of the studies provide a basis for describing the postsecondary paths of Tech-Prep participants, particularly in cases where the preponderance of studies have found consistent results.[12]

Tech-Prep and non-Tech-Prep students pursue college at roughly comparable rates, but the effects of Tech-Prep on postsecondary enrollment and completion are not known.

Student enrollment in postsecondary education has been a primary goal of Tech-Prep. Many Tech-Prep students do, in fact, enter college or training, and several studies suggest they do so at rates at least as high as those of other high school students (Table 4.7). Whether participation in Tech-Prep actually contributes to postsecondary enrollment cannot be determined from most evaluations; students who are involved in Tech-Prep may simply be higher achieving or more motivated than other students. One study of participation in Texas suggests some of the benefits of that state's form of Tech-Prep: the analysis found that in 1998 students who were considered "in Tech-Prep" in 12th grade were more likely to enroll in a postsecondary program than were similar 12th-grade students who were not enrolled in Tech-Prep (Hoachlander et al. forthcoming).[13]

No data are available about the proportion of students who complete a two-plus-two program or the benefits of doing so.

Unfortunately, no evaluations have been conducted to examine the effects of completing the comprehensive program of study model that Tech-Prep proponents originally envisioned. Existing studies have generally tracked outcomes at most a year or two after high school graduation, and only one publicly available report examines whether students continue into related postsecondary programs, an outcome promoted in the legislation. In national data sets, the number of students who fulfill the requirements of related

[11]To different degrees, the studies suffer from weak (nonrandom) sampling approaches; lack of or inadequate statistical controls for demographic, achievement, and motivational differences between Tech-Prep and non-Tech-Prep students; poor construction of matched comparison groups; very low response rates to follow-up surveys that provide information about postsecondary education enrollment and employment; and the absence of tests of statistical significance to validate differences between sample groups.

[12]A few studies focused only on high school outcomes (e.g., attendance, completion, or GPA), but there were too few of these studies and their shortcomings were too significant to report the findings.

[13]The same study found, however, that a relatively high share of the state's Tech-Prep seniors had not taken a sequence of occupational courses (at least three credits), suggesting substantial diversity in who is classified as Tech-Prep.

Table 4.7
Summary of Evaluation Findings about Tech-Prep Students' Transition to Postsecondary Education, Compared to the Transitions of Other Students

Focus of Evaluation	Cohort of Students	Comparison of Tech-Prep Transition Rates
National	1995 Tech-Prep graduates	Similar to national average
Texas	10th- to 12th-grade Tech-Prep students between 1994–1995 and 1998–1999	Slightly higher than all non-Tech-Prep students in state, including students who are in vocational programs but are not considered "in Tech-Prep"
Florida	All 1996 and 1997 Tech-Prep graduates	Similar to statewide average
Kentucky	All 1995 and 1996 Tech-Prep graduates	Slightly higher than statewide average
Eight "mature" consortia	1995–1998 Tech-Prep graduates in schools in eight sites	Higher in some sites, lower in other sites when compared to non-Tech-Prep students with similar 12th-grade class rankings and GPA in same schools

SOURCE: National (Hershey et al. 1998); all others (Paret and Hudis 2002).

secondary and postsecondary occupational study is too small to conduct analysis. Most states that publish outcomes of Tech-Prep students do not differentiate among postsecondary programs and outcomes; only Ohio separately documents transitions into related and unrelated postsecondary programs.[14]

The lack of information on rates of completion in two-plus-two programs appears to underscore, or perhaps reflect, the limited emphasis on comprehensive programs of study. On the other hand, as will be discussed further in Chapter 5, even the federal accountability provisions for Tech-Prep do not require such distinctions in state reporting of Tech-Prep student outcomes.

[14]Unfortunately, postsecondary information is based on a survey with extremely low response rates.

5. Program Management: Funding and Accountability

Federal legislation often relies on funding and accountability provisions to achieve specific policy goals and to signal priorities. Perkins III is no exception. The most significant difference between the 1998 law and its predecessor involved these program management tools. In particular, certain set-aside funding streams were eliminated in order to provide both a larger share of funds directly to local grantees and greater flexibility to state and local programs. The law also substantially increased the emphasis on program accountability, requiring states to set student performance targets and work toward achieving them or face funding consequences. Perhaps no other legislative requirements can affect grant recipients more directly than those governing funding and accountability.

This chapter first reviews the specific funding and accountability provisions in Perkins III (Section A) and then examines how they have been enacted, addressing three key questions:

1. Have the new provisions changed grant distributions or the use of funds at the secondary level, and are these changes consistent with congressional intentions (Section B)? What about at the postsecondary level? (Section C)
2. Has Perkins III affected how Tech-Prep funds are distributed? (Section D)
3. How have performance measurement and accountability systems been implemented in the early years of Perkins III? Are they likely to be effective in promoting program improvement? (Section E)

key findings ▶

► ***The new law succeeded in sending a higher share of funds to the local level.***

Between 1992 (early Perkins II) and 2001 (early Perkins III), the average size of a grant increased by approximately 34 percent for secondary grantees and by 26 percent for postsecondary grantees. This growth cannot be fully explained by increases in the inflation rate or in Perkins appropriations for the basic state grant (15.3 percent), or by a decline in the number of grants awarded. Higher grant amounts mostly reflect the new law's requirement that 85 percent of state Perkins funds (up from 75 percent under Perkins II) go to local grantees.

► ***States are taking advantage of the law's flexible funding options.***

Perkins III continued several provisions that give states some discretion over how they distribute local funds. According to state directors, 29 states currently use at least one of these options at the secondary level, and 20 do so at the postsecondary level. The most common choice is the newly established "reserve fund," which allows states under specified circumstances to award 10 percent of their Perkins allotment to local grantees without using the legislated intrastate funding formula.

► ***Targeting of funds to districts with the highest concentrations of poverty has declined somewhat over time.***

Perkins III funding to the local secondary level remains targeted to areas where there are high concentrations of poverty, though the strength of this relationship has diminished over time. Adjusting for district size, grant amounts per pupil increased for low-, medium-, and high-poverty districts between 1992 and 2001, but high-poverty districts experienced less of an increase than did other types of districts. Perkins funding continues to favor rural, urban, and small school districts.

► ***Little has changed under Perkins III in how local grants are spent.***

As was true under Perkins II, secondary local grants are most often used to purchase equipment and materials, perhaps because districts do not designate other funds for these needs. At the postsecondary level, keeping equipment up-to-date is more central to the missions of institutions, and Perkins funds are most likely to cover support services, particularly for special populations (e.g., child care, counseling) and professional development for vocational faculty.

► ► ►

- ***Federal funding represents a fraction of overall spending on vocational education.***

  In theory, the extent to which federal policy can affect practice is related to the federal share of spending. The best estimate is that Perkins III local grants represent, on average, about 5 percent of total expenditures on vocational education at the secondary level and about 2 percent at the postsecondary level. While these proportions are small, state and local administrators report that federal funds are used to fill essential needs.

- ***The quality of Perkins performance reporting varies considerably by indicator, by state, and sometimes even within states.***

  While much progress has been made in developing and implementing an accountability system since Perkins II, the accuracy and validity of the performance measures remain uneven. Some states use measures that are not well-matched to the performance sought (e.g., academic grade-point average (GPA) as an indicator of vocational-technical skill). And within states, local grantees may not use consistent definitions, measures, or data collection strategies, making judgments about aggregate state performance unreliable. States and local programs report that they have difficulty collecting data on various indicators, particularly for the vocational and technical skill indicator, and they often attribute their problems to rudimentary local data collection systems that depend heavily on hand counts.

- ***Early state performance results show significant variation in how high performance target levels were set but consistency in meeting those targets.***

  States reported an extremely wide range of performance levels for each indicator in Program Year 2000–2001, mainly because they used different definitions, measures, and data collection procedures. As required by Perkins III, states also established performance targets for subsequent years with a goal of improving student performance. Early results show that states negotiated modest levels of improvement—generally less than a 1 percentage point increase per year—and a majority of states met those targets.

- ***At least so far, most state and local administrators do not view Perkins III data as useful for program management and improvement.***

  States and local communities widely view Perkins III data collection as a compliance exercise consisting of gathering information that the federal government requires, not information that could be useful for state and local purposes. Few states and local entities use performance data to manage their programs or to identify districts and schools needing improvement.

A. Overview of Perkins Funding and Accountability Provisions

Perkins III reflects a trend in federal legislation toward greater flexibility in program funding and implementation in exchange for stricter emphasis on performance. Although many aspects of program management remain the same as under the previous law, some important modifications were made in Perkins III.

1. Perkins Funding

In many respects, the basic framework for federal vocational funding did not change when Perkins was modified in 1998 (Table 5.1). Each state receives a grant from the U.S. Department of Education (ED), based on population counts in several age categories. State agencies then allocate much of their grant to local programs, with the discretion to determine the share of Perkins funds allocated to institutions at the secondary versus postsecondary levels. Funds dedicated to secondary vocational education are distributed to secondary districts based largely on their proportion of low-income youths; money for postsecondary vocational education is distributed to community colleges and other eligible postsecondary institutions based largely on their share of Pell grant recipients. The compensatory nature of the funding formulas reflect both a desire to ensure equal access to vocational education and the reality that such courses and programs are often more costly to provide—perhaps by as much as 20 to 40 percent—than programs in most other subject areas.[1]

However, significant changes were made to Perkins III to further the goals of flexibility and increased local resources, including the following:

- Elimination of the set-aside funding streams for "special populations" (e.g., single parents, displaced homemakers, pregnant teenagers); a state gender equity coordinator;[2] and requirements that local education agencies target funds to schools and programs with the greatest concentrations of special populations.

- Increase in the share of funds for local programs (from 75 percent in Perkins II to 85 percent in Perkins III).

[1]Based on a review of national and state finance data, Klein (2001, p. 28) estimates the cost of providing vocational instruction as 20 to 40 percent higher than the cost of providing academic instruction. While salaries for academic and vocational instructors may be about the same, vocational class sizes are considerably smaller and equipment expenditures are higher.

[2]However, Perkins III mandates that $60,000–150,000 of state leadership funds be used for services that prepare individuals for nontraditional training and employment.

Table 5.1
Perkins III Funding Provisions

Funding Provision	Significant Change from Perkins II to Perkins III?	Description
		Federal Set-Asides
Native American reservation	No	Same share of Perkins federal appropriations reserved for Native Americans (1.25 percent) and Native Hawaiians (0.25 percent) and outlying areas (0.20 percent).
Incentive grants	Yes	Perkins III reserves 0.54 percent of the total Perkins appropriations for state incentive grants, as required in the Workforce Investment Act (WIA Sec. 503).
		State Grant Awards
State allocation	No	Federal-to-state formula based on population counts in several age categories and per capita income.
Minimum state grant allotment	No	States with the lowest population counts granted a minimum Perkins allotment of slightly over $4 million.
		State Set-Asides
Special populations	Yes	Perkins III eliminated set-aside funds for single parents, displaced homemakers, pregnant/parenting teens.
Gender equity	Yes	Perkins III eliminated requirements for a state gender equity coordinator and for 10.5 percent of the state allotment to be used for programs for single parents, displaced homemakers, single pregnant women, and the promotion of gender equity; these programs were replaced with a mandate that $60,000–150,000 of state leadership funds be used for nontraditional training and employment.
State leadership funds	Yes	Perkins III increased the amount from 8.5 percent to 10.0 percent and added more required and permissible activities.
State administration funds	No	A limit of 5 percent (or $250,000) of the state Perkins grant for state administration.
Reserve fund	Yes	Perkins III established a new provision that allows states to reserve up to 10 percent of local funding for programs in rural and other areas.

Table continued on following page

Table 5.1—continued
Perkins III Funding Provisions

Funding Provision	Significant Change from Perkins II to Perkins III?	Description
Local Grant Awards		
Proportion of Perkins grants available to local programs	Yes	Perkins III increased required funding to local recipients from 75 percent to 85 percent of the total state allocation.
Secondary/ postsecondary split	No	States continue to have discretion over the share of funds allocated to secondary and postsecondary programs.
Distribution of funds to secondary school programs	Yes	Perkins III modified the substate funding formula at the secondary level by eliminating the weight given to the number of students with disabilities and adults in vocational education and replacing those requirements with a weight based on overall student population counts. Formula continues same weight for number of low-income youth.
Distribution of funds to postsecondary institutions	No	State-to-postsecondary institution formula based primarily on number of Pell grant recipients.
Formula waivers	Change at secondary level; no change at postsecondary level	States can receive a waiver if they use an alternate substate allocation formula that can more equitably distribute funds to secondary grantees (which Perkins II did not allow) or to postsecondary grantees with low-income populations.
Minimal allocation	No	Allows states to go outside the legislated funding formula for substate distributions if either the secondary or postsecondary sector receives 15 percent or less of the total Perkins funds available for local programs.
Minimum local grant allotment	No	Minimum local grants of $15,000 for secondary vocational education and $50,000 for postsecondary vocational education. States may waive this requirement for secondary grantees that are too small to qualify as individual grantees. Where eligible postsecondary institutions too small to qualify as individual grantees are located in rural, sparsely populated areas, states may also waive the requirement that these institutions must enter postsecondary consortia.
Distribution of grant within district	Yes	Regulations issued under Perkins II required districts to distribute local grants to individual schools based on the number of each school's special populations; that regulation was eliminated (Office of the Federal Register 1992).

SOURCE: Carl D. Perkins Vocational and Applied Technology Education Act of 1990 (Public Law 101-392) and Carl D. Perkins Vocational and Technical Education Act of 1998 (Public Law 105-332).

- New local secondary funding formula, with less emphasis on the proportion of students with disabilities than previously.[3]

- Introduction of a state reserve (up to 10 percent of the allocation to local programs) that may be distributed outside the local secondary funding formula to support programs in rural areas; areas with high percentages or numbers of vocational and technical education students; and communities negatively affected by changes in the in-state secondary school formula.

While these funding changes were being debated and enacted into law, federal appropriations for Perkins state grants increased along with appropriations for other federal education programs. Annual appropriations for Perkins basic state grants increased by 15.3 percent between 1992 and 2001 (Table 5.2), the two years NAVE uses for analysis.[4] These increases generally translated into higher amounts for states.[5] However, the increase did not keep pace with the rate of inflation[6] or the funding increases of other federal education programs. The median state allotment was $13,368,617 in 1992 and $15,994,426 in 2001. Most of these funds were, in turn, distributed to local secondary and postsecondary programs, with the effect that, in 2001, federal vocational grants amounted to about 5 percent of local spending on secondary vocational education programs[7] and about 2 percent of spending at the postsecondary level.[8] The federal share remained relatively constant between 1992 and 2001.

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[3]Under Perkins II (Sec. 231) and in the first (transitional) year of Perkins III (Sec. 131), states were required to allocate funds to local secondary grantees using a formula with weights based on the number of Title I students (70 percent weight), the number of students eligible under the Individuals with Disabilities Education Act (20 percent weight), and the number of students and adults in the district who were in training programs (10 percent weight). The new formula dropped the weight for students eligible under IDEA; local funds are now allocated according to the *total* number of individuals aged 15–19 who reside in the grantee school districts (30 percent) and the number of those individuals whose family income falls below the poverty line (70 percent) (Sec. 131).

[4]NAVE uses 1992 and 2001 for analysis of changes for two reasons: (1) these years reflect comparable early years of Perkins II (1990) and Perkins III (1998), and (2) funding data were collected under the previous NAVE in 1992, while the current NAVE collected comparable data in 2001.

[5]Even though the legislated state allocation formula remained the same under Perkins II and III, increased appropriations did not affect states equally because of differences in state population growth, a factor in the formula for computing the funding allocations.

[6]Inflation increased 26.8 percent between 1992 and 2001 based on the Consumer Price Index (CPI) school calendar year, compared to the 15.3 percent increase in Perkins appropriations (Table 5.2).

[7]The federal share of local vocational spending at the secondary level was computed as the average district Perkins grant ($101,813 in 2001) divided by estimated average district spending on high school vocational education ($1,961,495). District spending was computed by multiplying the average expenditure per student in public school districts—$8,105 (Wirt et al. 2003, p. 77, Indicator 39)—by the number of high school students, divided by the number of districts, and then adjusted to reflect vocational education's share of the high school curriculum (see Chapter 2) and the higher cost of those courses (Klein 2001).

[8]The federal share of local vocational spending at the postsecondary level was calculated as the average Perkins postsecondary grant ($285,645) divided by estimated average community college spending on vocational programs. The latter figure was derived using data on total two-year postsecondary expenditures (Snyder et al. 2003, Table 344), divided by the number of such institutions, and then adjusted to reflect the portion of majors in those institutions that choose a vocational program of study (see Chapter 3).

Table 5.2

Amounts of Perkins State Grant Allocations and Reservations: 1992 and 2001

State	1992	2001
Alabama	$18,493,908	$20,036,322
Alaska	$4,214,921	$4,214,921
Arizona	$14,813,300	$20,178,519
Arkansas	$10,276,155	$11,925,341
California	$95,689,053	$120,745,507
Colorado	$11,448,761	$14,415,073
Connecticut	$9,005,327	$8,826,329
Delaware	$4,214,921	$4,468,631
District of Columbia	$4,214,921	$4,214,921
Florida	$41,552,691	$51,525,165
Georgia	$26,758,908	$31,493,636
Hawaii	$4,699,626	$5,376,800
Idaho	$4,699,626	$6,619,244
Illinois	$37,481,798	$41,157,929
Indiana	$22,791,404	$24,786,555
Iowa	$10,662,123	$12,381,109
Kansas	$8,940,430	$11,370,063
Kentucky	$16,637,536	$18,364,632
Louisiana	$19,221,631	$22,051,050
Maine	$4,695,577	$5,376,800
Maryland	$13,742,757	$15,994,426
Massachusetts	$17,429,978	$17,323,922
Michigan	$34,720,846	$38,255,683
Minnesota	$15,092,540	$17,410,608
Mississippi	$12,364,726	$13,920,402
Missouri	$19,059,451	$22,506,237
Montana	$4,214,921	$5,268,996
Nebraska	$5,917,914	$7,138,876
Nevada	$4,699,626	$5,854,216
New Hampshire	$4,699,626	$5,376,800
New Jersey	$21,151,258	$22,257,214
New Mexico	$6,595,354	$8,559,863
New York	$52,699,128	$52,486,933
North Carolina	$28,486,370	$29,975,525
North Dakota	$4,214,921	$4,214,921
Ohio	$41,619,711	$44,682,695

Table continued on following page

Table 5.2—continued

Amounts of Perkins State Grant Allocations and Reservations: 1992 and 2001

State	1992	2001
Oklahoma	$13,368,617	$16,119,667
Oregon	$10,379,115	$13,191,901
Pennsylvania	$41,635,031	$42,540,576
Rhode Island	$4,699,626	$5,376,800
South Carolina	$16,293,814	$17,647,448
South Dakota	$4,214,921	$4,328,867
Tennessee	$20,831,8561	$22,531,516
Texas	$71,509,430	$86,234,261
Utah	$8,372,087	$12,453,906
Vermont	$4,214,921	$4,214,921
Virginia	$21,516,428	$24,827,445
Washington	$16,653,997	$21,232,147
West Virginia	$8,009,762	$8,428,617
Wisconsin	$18,463,176	$21,603,995
Wyoming	$4,214,921	$4,214,921
Reservations for Territories, Outlying Areas, and Other		
American Samoa	$191,336	$190,000
Guam	$503,513	$500,000
Northern Mariana Islands	$191,336	$190,000
Puerto Rico	$17,816,604	$19,089,614
Virgin Islands	$509,173	$567,534
Palau	$0	$0
Marshall Islands	$0	$0
Micronesia	$0	$0
Indian Tribe Set Aside	$12,259,166	$13,750,000
Other	$898,256	$10,010,000
Total	$954,259,166	$1,100,000,000

SOURCE: U.S. Department of Education, Office of the Deputy Secretary, Budget Service. *State Funding History Tables by Program.* http://www.ed.gov/about/overview/budget/history/index.html?src=rt (accessed March 30, 2004).

2. Perkins Accountability

On the surface, the general accountability requirements contained in Perkins III are similar to those in the earlier Perkins II (1990). However, the new accountability provisions are a much more significant instrument of federal policy than they were in the previous act and elevated the expectation of Congress that states would develop meaningful systems of performance measurement and improvement. Compared to Perkins II, Perkins III raises the requirements for state reporting of student outcome data (including mandating more measures of performance) and the potential rewards and consequences for states that do and do not improve their program performance (Table 5.3).

Table 5.3
Perkins III Accountability Provisions

Accountability Provision	Significant Change from Perkins II to Perkins III?	Brief Description
Performance Measures and Levels		
Performance measures	Yes	States must now develop at least four core indicators of performance: (1) academic and vocational skills attainment, (2) completion, (3) post-program outcomes such as employment, further education or training, and military service, and (4) non-traditional participation and completion.
Performance levels	Yes	Perkins III requires states to negotiate performance improvement levels for each year.
Performance Reporting		
State reporting	Yes	States must report performance levels each year to ED, including the level of performance for special populations.
Federal reporting	Yes	The secretary of education must disseminate state-by-state comparisons of performance to Congress and the general public.
Sanctions and Rewards		
State allotment	Yes	The secretary of education may withhold all or a portion of the state's allotment based on the state's performance.
Incentive grants	Yes	States are eligible for WIA incentive grants if they exceed their negotiated Perkins performance levels (WIA, Sec. 503).

SOURCE: Carl D. Perkins Vocational and Applied Technology Education Act of 1990 (Public Law 101-392) and Carl D. Perkins Vocational and Technical Education Act of 1998 (Public Law 105-332).

Perkins III requires each state to develop a system of measurements and to establish expected levels of performance in four categories:[9]

1. Student attainment of academic, vocational, and technical skill proficiencies.
2. Completion of a secondary or postsecondary degree or credential.
3. Placement and retention in postsecondary education, advanced training, employment, or the military.
4. Participation in and completion of programs that lead to nontraditional employment.

In addition, each state is required to report on the progress of special populations with respect to their performance in each of these categories.

However, the major changes in Perkins III accountability have less to do with the types of measures that are required than with how performance data, once collected, are to be used. Under Perkins III, for example:

- ***Performance goals are set.*** States must negotiate quantifiable levels of performance[10] with ED and report yearly to the secretary of education on progress made in meeting these standards. The previous act simply required assurance from states that a system of measures had been implemented but did not require target performance levels.

- ***State data must be submitted.*** States are required to submit performance results to ED; the secretary of education must make this information available to the public and compile state-by-state comparisons. The previous act did not require states to submit data.

- ***Rewards and penalties are possible.*** Perkins III raises the potential stakes associated with performance. Under the law, failure to meet state-level performance standards could eventually result in loss of some or all of a state's Perkins funds. As a reward, however, Section 503 of the Workforce Investment Act (WIA) provides incentive grants to states that exceed performance levels under the Perkins Act, Adult Education and Family Literacy Act, and Title I of WIA.

This chapter examines in greater depth the funding and accountability changes in Perkins III and their effects on states and vocational programs at the local level.

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[9]See Perkins III, Sec. 113.

[10]States can renegotiate levels of performance prior to the third program year covered by the state plan.

B. Perkins State Grant Funding at the Secondary Level

As noted earlier, the Congress that enacted Perkins III was driven by two main objectives with respect to the use and allocation of Perkins funding. First, Congress wanted a larger share of funding to go directly to local programs. Second, it wanted to give states more funding flexibility in order to better meet the needs of their communities. These preferences led Congress to legislate new funding provisions that can affect both grantee allocations and the distribution of money.

1. Basic Allocations and Use of Flexibility Provisions

Local grants made under the Perkins Act are shaped by a combination of legislative specification and state choices. The law mandates the local funding formula and the maximum proportion of the state allocation that can be retained for state administration (5 percent) and state leadership (10 percent). However, Perkins III includes several provisions that allow states and local grantees flexibility in distributing grant funds.

In Perkins III, states continue to have discretion over how Perkins money is split between the secondary and postsecondary sectors, but they have made few changes overall from the previous act.

As was true in previous legislation, Perkins III allows states to determine the relative share of the annual state allotment that goes to secondary and postsecondary vocational education.[11] These preferences appear to be quite stable: nationally, states decided to distribute funds between secondary and postsecondary sectors in much the same way they did under Perkins II, with 62 percent of local Perkins funds allocated to the secondary level and 38 percent to the postsecondary level (Table 5.4).[12]

Most states continued their historical patterns of secondary-postsecondary allocations, with shifts of less than 5 percent over the last decade. But there were a few exceptions. Three states (Iowa, Minnesota, and New Mexico) reported a relatively large shift (over

[11]Decisions about the split have historically reflected the responsibilities of the sole state agency that oversees Perkins funding, the extent to which other funds support districts and postsecondary institutions, and political support for vocational education at either or both levels.

[12]The 62–38 percent split is based on analysis of actual local grant allocation data from the 41 states that could provide the data in 1992 and 2001 (Table 5.4). A separate survey of state directors' estimates of their allocations suggests that, nationally, the split is closer to 65 percent for secondary grantees and 35 percent for postsecondary grantees with the average split weighted by the size of each state (analysis of National Survey of State Directors of Vocational Education, 2001).

Table 5.4

Percentage of Perkins Grant Funds Allocated to Secondary and Postsecondary Vocational Education: 1992 and 2001

State	Secondary		Postsecondary		Percentage Point Change in Share Allocated to Secondary
	1992	2001	1992	2001	
National Average[1]	61.9	61.7	38.1	38.3	-0.2
Alabama	66.2	62.7	33.8	37.3	-3.5
Alaska	n/a	87.3	n/a	12.7	n/a
Arizona	85.6	85.7	14.4	14.3	0.1
Arkansas	71.0	74.8	29.0	25.2	3.8
California	45.3	41.2	54.7	58.8	-4.1
Colorado	40.0	41.9	60.0	58.1	1.9
Connecticut	78.5	85.6	21.5	14.4	7.1
Delaware	85.0	n/a	15.0	n/a	n/a
District of Columbia	n/a	n/a	n/a	n/a	n/a
Florida	52.8	53.1	47.2	46.9	0.3
Georgia	50.1	48.7	49.9	51.3	-1.4
Hawaii	50.0	50.0	50.0	50.0	0.0
Idaho	70.0	65.1	30.0	34.9	-4.9
Illinois	66.0	60.0	34.0	40.0	-6.0
Indiana	63.6	n/a	36.4	n/a	n/a
Iowa	28.0	56.4	72.0	43.6	28.4
Kansas	50.0	55.5	50.0	44.5	5.5
Kentucky	44.3	48.8	55.7	51.2	4.5
Louisiana	56.0	55.2	44.0	44.8	-0.8
Maine	52.6	50.0	47.4	50.0	-2.6
Maryland	70.0	65.0	30.0	35.0	-5.0
Massachusetts	81.1	70.8	18.9	29.2	-10.3
Michigan	58.0	n/a	42.0	n/a	n/a
Minnesota	9.2	36.1	90.8	63.9	26.9
Mississippi	45.7	52.5	54.3	47.5	6.8
Missouri	70.0	70.5	30.0	29.5	0.5
Montana	65.0	62.7	35.0	37.3	-2.3
Nebraska	50.0	59.9	50.0	40.1	9.9
Nevada	75.0	67.9	25.0	32.1	-7.1
New Hampshire	n/a	79.3	n/a	20.7	n/a
New Jersey	76.7	66.0	23.3	34.0	-10.7
New Mexico	7.9	35.9	92.1	64.1	28.0
New York	66.3	56.9	33.7	43.1	-9.4
North Carolina	69.4	n/a	30.6	n/a	n/a
North Dakota	64.8	65.4	35.2	34.6	0.6
Ohio	82.2	82.0	17.8	18.0	-0.2
Oklahoma	84.0	88.1	16.0	11.9	4.1

Table 5.4—continued

Percentage of Perkins Grant Funds Allocated to Secondary and Postsecondary Vocational Education: 1992 and 2001

State	Secondary 1992	Secondary 2001	Postsecondary 1992	Postsecondary 2001	Percentage Point Change in Share Allocated to Secondary
Oregon	50.3	n/a	49.7	n/a	n/a
Pennsylvania	71.0	70.4	29.0	29.6	-0.6
Rhode Island	89.5	n/a	10.5	n/a	n/a
South Carolina	86.8	81.7	13.2	18.3	-5.1
South Dakota	41.8	42.6	58.2	57.4	0.8
Tennessee	85.9	89.4	14.1	10.6	3.5
Texas	56.1	57.4	43.9	42.6	1.3
Utah	60.0	57.7	40.0	42.3	-2.3
Vermont	79.8	80.0	20.2	20.0	0.2
Virginia	85.0	84.9	15.0	15.1	-0.1
Washington	42.4	42.7	57.6	57.3	0.3
West Virginia	77.2	78.2	22.8	21.8	1.0
Wisconsin	45.0	44.3	55.0	55.7	-0.7
Wyoming	n/a	65.0	n/a	35.0	n/a

SOURCE: White et al. forthcoming. Analysis of National Survey of State Directors of Vocational Education, Fiscal Data 1992 and 2001.

[1]Average based on 41 states for which grant amounts were available in both 1992 and 2001.

n/a = not available or missing data.

25 percentage points) toward the secondary level. Two states (Massachusetts and New Jersey) increased the share of Perkins funding to postsecondary vocational education (by over 10 percentage points).

Consistent with congressional expectations, local secondary grantees received more funds under Perkins III.

One major change introduced in Perkins III was a requirement that a higher share of the state allocation go to local grantees (85 percent, compared to 75 percent under Perkins II). The new law appears to have succeeded in this goal. As shown in Table 5.5, a comparison of Perkins grant awards reported by state directors in 1992 and 2001 indicates the following:[13]

[13]Comparisons of grants between 1992 and 2001 are based on states that provided grant data in both years.

Table 5.5
Number and Amount of Secondary Grants Awarded and Percentage Change: 1992 and 2001

Number and Amount of Grants	1992	2001	Difference	Percentage Change
Number of grants	4,232	4,424	192	4.5
Amount (grant size)				
Current dollars[1]	$76,238	$101,813	$25,575	33.5
Real dollars (2001)[2]	$96,670	$101,813	$5,143	5.3

SOURCE: White et al. forthcoming. Analysis of National Survey of State Directors of Vocational Education, Fiscal Data 1992 and 2001.

[1]Current dollars are the actual grant amounts that were allocated and reported in the given year (1992 or 2001).
[2]Real dollars have been adjusted for a measure of inflation.

- ***The average grant size increased substantially.*** Nationally, the average secondary grant amount increased by one-third between Perkins II and Perkins III.

- ***More grants were awarded.*** The average amount grantees received did not increase simply because funds were awarded to fewer districts; generally, states awarded more Perkins grants at the secondary level during the same period.[14,15]

- ***The increase in the secondary grant size cannot be explained by a change in the secondary-postsecondary split or higher Perkins appropriations.*** If states chose to designate a higher proportion of Perkins funds to secondary vocational education, then average secondary grant sizes could increase even without a higher share of funds going to the local level. But, in fact, the secondary-postsecondary split remained the same between Perkins II and Perkins III. Also, the increase in Perkins appropriations for basic grants during the period was only 15.3 percent (Table 5.2),[16] compared to a 33.5 percent increase in secondary grant amounts. Therefore, the higher grant amounts are not due solely to higher federal program budgets.

[14]Tracking the number of grantees can be difficult because in one year a state might combine school districts in consortia and in another year waive minimum grant requirements and give grants directly to small school districts in rural areas or to charter schools that cannot enter consortia.

[15]State surveys indicate that 93 percent of all local applications for Perkins secondary funds in FY 2001 were approved and awarded Perkins funds. Only six states reported that they rejected one or more local application for Perkins secondary funds (analysis of National Survey of State Directors of Vocational Education, 2001).

[16]Overall Perkins appropriations may authorize a number of other relatively smaller vocational programs each year, not just the basic grant program and special reservations as presented in Table 5.2. When accounting for all programs authorized under Perkins, the budget increased 7.3 percent between 1992 and 2001 (analysis of historical budget statistics, U.S. Department of Education, Office of the Deputy Secretary, Budget Service).

- ***Purchasing power expanded to some extent.*** The increase in the average grant size was slightly higher than inflation during the same period, suggesting that grantees had at least as much resource capacity from federal funds as they did a decade earlier under Perkins II.

- ***Secondary grant size increased in most states in 2001, although the average amounts varied considerably by state.*** In most states, the average grant size increased, with the exception of Montana, Nevada, and South Dakota (Table 5.6). However, as was true under Perkins II, compared to the national average of $101,813, the average Perkins III state grant ranged widely from a low of $26,224 in Montana to a high of $2,285,140 in Hawaii.[17] This variation is partly attributable to several factors: each state's secondary-postsecondary split, the number of grants made including the extent to which states use consortium grants to group small districts, and school district size. Even within states, actual grant size varied by a wide margin.

Table 5.6

Average, Maximum, and Minimum Secondary Grant Amounts, by State: 2001

State	Average Grant	Change from 1992[1]	Maximum Grant	Minimum Grant
National Average	$101,813	+	$13,526,258	$582
Montana	$26,224	–	$656,347	$1,000
South Dakota	$28,605	–	$146,032	$886
Washington	$34,955	+	$543,439	$582
Texas	$41,164	+	$3,104,501	$1,500
Wyoming	$47,060	n/a	$332,601	$2,496
Mississippi	$48,372	+	$473,279	$4,896
Kentucky	$48,499	+	$1,084,916	$2,702
North Dakota	$50,279	+	$209,796	$5,547
Idaho	$62,024	+	$355,505	$1,687
Alaska	$66,078	n/a	$1,102,628	$15,000
Kansas	$71,443	+	$650,327	$5,879
Georgia	$72,072	+	$818,653	$8,701
Colorado	$75,131	+	$811,763	$3,934
Alabama	$75,837	+	$1,211,668	$8,159
Maine	$75,943	+	$173,441	$27,900

Table continued on following page

[17]Hawaii is the only state with just one school district. Thus, Hawaii's grant size is equal to the total amount of Perkins money allocated to the state's secondary vocational education programs. If we were to examine states with more than one school district, however, then Utah would have the highest average Perkins grant size ($688,846.)

Table 5.6—continued

Average, Maximum, and Minimum Secondary Grant Amounts, by State: 2001

State	Average Grant	Change from 1992[1]	Maximum Grant	Minimum Grant
Connecticut	$77,709	+	$1,048,221	$15,000
Oklahoma	$78,113	+	$994,299	$3,986
Nebraska	$79,984	+	$894,496	$15,235
Arkansas	$87,356	+	$497,306	$15,379
West Virginia	$90,367	+	$505,548	$8,779
Wisconsin	$92,334	+	$2,212,247	$5,151
Minnesota	$104,482	+	$1,045,389	$15,001
New Jersey	$112,699	+	$982,291	$2,550
New Mexico	$117,303	+	$810,549	$22,777
California	$118,929	+	$7,632,316	$2,400
Arizona	$120,961	+	$2,730,984	$1,150
South Carolina	$128,254	+	$933,272	$13,588
New Hampshire	$136,751	n/a	$514,526	$45,228
Virginia	$137,260	+	$1,420,159	$5,640
Tennessee	$139,909	+	$3,086,573	$11,744
Louisiana	$149,794	+	$1,469,956	$16,014
Missouri	$151,026	+	$1,563,874	$3,222
Vermont	$166,944	+	$290,948	$12,843
Pennsylvania	$213,181	+	$5,704,966	$19,543
Nevada	$225,457	–	$2,181,208	$2,912
Ohio	$322,241	+	$2,667,048	$46,833
Florida	$324,189	+	$3,969,864	$13,030
Illinois	$354,369	+	$8,511,898	$31,392
Maryland	$356,424	+	$2,735,562	$30,546
New York	$558,769	+	$13,526,258	$73,257
Utah	$688,846	+	$2,418,246	$225,604
Hawaii	$2,285,140	+	$2,285,140	$2,285,140
Delaware	n/a	n/a	n/a	n/a
Indiana	n/a	n/a	n/a	n/a
Iowa	n/a	n/a	n/a	n/a
Massachusetts	n/a	n/a	n/a	n/a
Michigan	n/a	n/a	n/a	n/a
North Carolina	n/a	n/a	n/a	n/a
Oregon	n/a	n/a	n/a	n/a
Rhode Island	n/a	n/a	n/a	n/a

SOURCE: White et al. forthcoming. Analysis of National Survey of State Directors of Vocational Education, Fiscal Data 1992 and 2001.

[1]Statistics based on 39 states for which secondary grantee-level data were available in both 1992 and 2001.

n/a = not available or missing data.
+ = average grant size increased between 1992 and 2001.
– = average grant size decreased between 1992 and 2001.

Although there was an increase in the number of secondary grants awarded, slightly fewer eligible districts seemed to be included.

Local education agencies (LEAs) can receive Perkins funding either through an individual grant or as part of a consortium grant. This occurs if the LEA is too small or does not have sufficiently high concentrations of poverty to otherwise qualify on its own for at least the minimum grant amount of $15,000. According to grant award data provided by state directors, not all LEAs receive Perkins funding in a given year (Table 5.7). In fact, 35.8 percent of LEAs did not receive any Perkins funding in 2001, a slightly larger proportion than in 1992.[18]

Table 5.7
Percentage of Eligible Districts[1] Awarded Perkins Funds[2]: 1992 and 2001

Secondary Sector	1992	2001
School districts with secondary school(s)	67.2	64.2

SOURCE: White et al. forthcoming. Analysis of National Survey of State Directors of Vocational Education, Fiscal Data 1992 and 2001, and NCES, Common Core of Data (CCD).

[1]"Eligible recipients" as defined here and used as the denominator in these calculations, include all local education agencies and identifiable area vocational schools that have at least 10th-, 11th-, or 12th-grade education, either as independent LEAs or as part of a consortia, based on the CCD.

[2]Number of grants are based on the 39 states that reported in both years (1992 and 2001) and provided district-level data.

Local Perkins funding for secondary education primarily went to regular districts with comprehensive high schools in 2001.

A variety of institutions are eligible for secondary Perkins funds under Perkins III, as was true in the earlier legislation: LEAs, area vocational schools (AVSs), middle schools, Bureau of Indian Affairs (BIA) schools, and others. However, according to a survey of state directors, districts send nearly four out of five Perkins dollars to comprehensive high schools, the most common type of secondary school. AVSs, far less prevalent but still widespread in many areas of the country, receive a smaller share (15.6 percent) of Perkins secondary funds. Very few funds are distributed to schools that do not typically enroll high school students, such as middle schools and adult vocational programs (Table 5.8).

[18]Some districts might not apply for a Perkins grant because they do not offer vocational programs or programs that meet Perkins criteria. States can also change their requirements for distributing Perkins grants. In one year, grants could be given to consortia if districts are too small to qualify. In another year, the requirement could be waived under certain, legislated circumstances, and small school districts could then qualify for individual grants.

Table 5.8
Percentage of Local Secondary Perkins Funds Allocated, by School/Program Type: 2001

School/Program Type	Percentage of Local Secondary Perkins Funds
Comprehensive high schools	79.8
Area vocational schools (AVSs)	15.6
Other	4.7
Adult vocational programs operating in LEAs	1.2
Adult vocational programs operating in AVSs	0.5
Middle schools	0.3
BIA schools[1]	0
Intermediary agencies such as ROP or BOCES	0
Not otherwise classified	2.6

SOURCE: White et al. forthcoming. Analysis of National Survey of State Directors of Vocational Education, 2001.

[1]According to state reports, BIA schools received a total of $162,135 in four states in FY 2001, an amount that represented approximately 0 percent of local allocations even when rounding.

A very small number of Bureau of Indian Affairs- (BIA) funded schools received secondary Perkins grants in FY 2001.

Both Perkins II and III mandated a federal set-aside of 1.25 percent of the total Perkins appropriation to be allocated to programs serving Native Americans and Alaska Natives, including BIA-funded schools.[19] However, Perkins III made BIA secondary schools ineligible for direct grants under the Native American set-aside but eligible for local Perkins grants as if they were separate LEAs. This potentially opened the door for more Perkins funding for BIA-funded secondary schools, although these schools are subject to the same formula and minimum grant provisions as are other LEAs.

A total of 15 states reported that they have BIA high schools in their states. However, only four indicated that they awarded state Perkins grants to BIA-funded secondary schools in FY 2001: Arizona, California, and North Dakota each have two such schools, and South Dakota has one. The most likely explanation is that the BIA schools are too

[19]In practice, however, most of the 30–35 competitive grants awarded each year under the federal 1.25 percent set-aside go to postsecondary programs serving high proportions of Native Americans, including programs offered by tribally controlled colleges (U.S. Department of Education, Office of Vocational and Adult Education. *Native American Vocational and Technical Education Program*. http://www.ed.gov/programs/cteivep/awards.html (accessed March 30, 2004)).

small to qualify for funds as individual grantees, although some may have received funds as part of consortium grants.

District coordinators distribute Perkins funds to schools based on their perception of need.

Although a majority of districts have only one high school, Perkins III allows LEAs considerable discretion over how to apportion their local grants where they have multiple eligible schools and programs. Case studies suggest that these decisions are typically made by a person designated as the district's "Perkins" or vocational education coordinator, often in consultation with the district superintendent (White et al. forthcoming). The choices typically reflect both a consideration of need and some cycle of rotation—i.e., the amount of time since the school or program received funds for equipment or other improvement; the desire to launch a new program in one or several schools (e.g., the popular information technology (IT) programs); or a key change in technology. Some very large districts use a competitive process to distribute funds; in Chicago, for example, schools submit proposals and must specify the particular programs and needs for which funding is requested. Districts typically do not take into account potential differences in resource disadvantage among schools when Perkins funds are distributed.

This process for allocating funds within LEAs does not appear to have changed with the implementation of Perkins III. However, Perkins coordinators interviewed in the case studies suggested that eliminating the Perkins regulatory requirement that LEAs target funds to programs with the greatest concentration of special populations has allowed districts to distribute Perkins funds to more schools, including schools with lower proportions of special populations.

States are taking advantage of some options for secondary funding flexibility—one of the pillars in Perkins III.

The primary flexibility provisions were carried forward from Perkins II, and policymakers introduced two additional tools—the reserve fund and the waiver of the secondary-level substate distribution formula—in the 1998 law. Many states took advantage of these options to fund secondary grantees in ways that deviated from federal prescription, with 29 states using at least one of three main options in FY 2001 (Table 5.9).[20]

[20]In 2001, five states were eligible for an additional flexibility provision, but only two exercised the option (analysis of National Survey of State Directors of Vocational Education, 2001). Called the *minimal allocation*, it is available only to those states that, in the secondary-postsecondary split, choose to allocate 15 percent or less of local funding to either sector. When there is this minimal allocation, for example to the secondary level, the law gives states the discretion to distribute local funds outside the legislated substate formula on a competitive basis or by using alternative methods that distribute funds to areas of greatest economic need.

Table 5.9
Number of States Using Perkins Funding Flexibility Provisions: 2001

Secondary Sector	Reserve Fund	Formula Waiver	Minimum Local Grant Allocation Waiver	Any Flexibility Option
States	21	0	24	29

SOURCE: White et al. forthcoming. Analysis of National Survey of State Directors of Vocational Education, 2001.

- ***Reserve Fund:*** This provision permits states to use up to 10 percent of the state's required local grant funding (or 8.5 percent of the state allotment overall) to distribute outside of the legislated substate formula.[21] Twenty-one states have chosen to use this option, with 13 states using the full 10 percent and 8 states reserving 7 percent or less of their local funding to distribute in this way.

  By law, states are required to target reserve funds to programs with at least two out of four types of need: (1) rural areas, (2) areas with high percentages of vocational students, (3) areas with high numbers of vocational students, and (4) communities negatively affected by changes in the substate secondary school formula. States have used these criteria in diverse ways, with the greatest emphasis (12 states) placed on awarding funds to rural grantees (Table 5.10).

- ***Formula Waiver:*** This waiver allows states to use an alternate funding formula that would better target Perkins secondary funds to school districts with high concentrations of poverty. However, according to the Office of Vocational and Adult Education, no state received a waiver from the U.S. Department of Education to allocate secondary funds using a different formula in 2001.[22]

- ***Minimum Local Grant Allocation Waiver:*** In order to ensure that federal funds are of sufficient scope to have an impact at the local level, both Perkins II and Perkins III set a minimum amount for local secondary grants ($15,000). Both laws also included waivers for this provision, giving states flexibility to award grants that are less than $15,000 if the LEA is (1) located in a rural, sparsely populated

[21]Under Perkins III, states must award at least 85 percent of their total state Perkins allotment to local grantees. The 10 percent of this local pool of funds for the reserve fund option is equivalent to 8.5 percent of the total allotment.

[22]The funding formula for secondary vocational programs under Perkins III also requires states to use data on the number of individuals aged 15 to 19 who resided in the school district in the preceding fiscal year. Because reliable data for this age group (e.g., Census 2000 data) were not available for states to use at the time, ED granted waivers for states to use alternative data sources, such as NCES enrollment or Census data on the number of individuals aged 5 to 17.

Table 5.10
Use of the Reserve Fund, by State: 2001

State	Percent of State's Local Grant Funding (10 percent maximum)	How Funds Were Allocated	Percentage of Reserve Funds Allocated to: Rural Areas	Areas with High Percentages of Vocational Students	Areas with High Numbers of Vocational Students	Communities Negatively Affected by Perkins III
Alabama	10	Competition				
Alaska	10	Other	✓	✓		✓
Arizona	10	Alternate formula		✓	✓	✓
Colorado	10	Alternate formula	✓	✓		
District of	5	Other		✓	✓	
Florida	10	Alternate formula	✓			✓
Georgia	10	Alternate formula	✓	✓		
Maine[1]	10	Other	✓			
Massachusetts	1	Alternate formula			✓	✓
Missouri	10	Alternate formula		✓	✓	
Montana	10	Competition	✓			✓
Nevada[1]	2	Alternate formula	✓			
New Jersey	4	Alternate formula	✓	✓		
Ohio	n/a	Alternate formula	n/a	n/a	n/a	n/a
Oklahoma	10	Alternate formula		✓		✓
Pennsylvania[1]	3	Other	✓			
South Carolina	7	Other	✓		✓	
South Dakota	10	Competition	✓	✓	✓	
Texas	10	Alternate formula	n/a	n/a	n/a	n/a
Washington[1]	2	Alternate formula				✓
Wisconsin	10	Competition	✓	✓	✓	✓

SOURCE: White et al. forthcoming. Analysis of National Survey of State Directors of Vocational Education, 2001.

[1]Although the legislation specifies that reserve funds are to be distributed to at least two or more of the four areas of need, four states reported only targeting one.

n/a = not available or missing data.
A "✓" represents states that reported distributing reserve funds to these areas of need.
A blank cell represents states that did not distribute reserve funds to these areas.

area or (a new category in Perkins III) is a public charter school operating a vocational program and (2) is unable to enter a consortium. According to the reports of state directors, nearly half of states (24) were using the waiver in 2001, making it the most commonly adopted flexibility option (White et al. forthcoming).

Case studies indicate that the minimum local grant waiver has been used in most cases to fund smaller districts and charter schools at levels considerably below $15,000 (White et al. forthcoming). In one state, for example, charter schools received an average of $3,000 in Perkins funds if they had a vocational program or could demonstrate they were starting one. Another state used the minimum grant waiver to support 73 small rural schools that were unable to form consortia due to the large distances that separated them.

2. Targeting

The Perkins III legislated funding strategy continues to reflect a compensatory emphasis and therefore policymakers are likely to be interested in how effectively resources are targeted. Under Perkins III, 70 percent of the secondary funding formula weighting is based on the number of low-income students in the community. However, Perkins III eliminates the lesser weights in the Perkins II formula on the number of students who have individualized education plans under the Individuals with Disabilities Education Act (20 percent) and the number of students in LEAs and adults in training programs (10 percent). Instead, 30 percent of the formula weight is based on counts of the general youth population (ages 15–19).

Perkins funding remains targeted to areas with high concentrations of poverty, but the strength of this relationship has diminished over time.

Local grants awarded under Perkins III continue to reflect policymakers' interest in promoting equal access to vocational programs for students in low-income areas. However, the emphasis on poverty in the grant distribution process has lessened since Perkins II, when examined according to several different measures. In particular, when grant amounts are adjusted for the size of the secondary population of LEAs (a criterion in the funding formula), high-poverty districts do not appear to have benefited as much under Perkins III as have other districts.

- ***Amounts and shares of Perkins secondary funds were greatest for school districts with high concentrations of poverty in 2001***. On a per secondary student basis,[23] the amount of Perkins funds received by high-poverty school districts was $53 in 2001, well above the amount for low-poverty ($41) and medium-poverty ($32)

[23]To estimate targeting by poverty level, the dollar per potential participant was calculated by dividing the Perkins grant amounts in LEAs by the number of secondary students enrolled in that LEA. This calculation provides the Perkins dollar amount per secondary student. Because most students take at least one vocational course at some point in secondary school, the amount takes into account students who potentially may participate in secondary vocational education.

school districts (Table 5.11). In addition, as might be expected under the legislated formula, high-poverty districts received a disproportionate share of Perkins funds in 2001: they represented 28.4 percent of grantees but received 42.0 percent of local funds nationally.

- ***The relative funding advantage of high-poverty school districts declined between Perkins II and Perkins III.*** As noted earlier, the average secondary grant size increased between 1992 and 2001, but this increase seems to have affected LEAs differentially. Among high-poverty districts, the average grant amount per secondary student increased by only $2, while the increase was $4 for medium-poverty districts and $9 for low-poverty districts (Table 5.11). As a result, the ratio of high- to low-poverty district amounts fell from 1.6 in 1992 ($51 / $32) to 1.3 in 2001 ($53/ $41). It is also important to note that the more advantaged low-poverty districts actually received a higher per student grant amount than did the medium-poverty districts under both Perkins II and Perkins III.

Table 5.11
Average Perkins Grant Amounts per Secondary Student and Distribution of Perkins Funds, by LEA Poverty Level: 1992 and 2001[1]

	1992	2001		
Poverty Level[2]	Perkins Dollar Amount per Secondary Student[3]	Perkins Dollar Amount per Secondary Student[3]	Percentage of Perkins Funds Received by Grantees	Percentage of All Grantees
High-poverty school districts	$51	$53	42.0	28.4
Medium-poverty school districts	$28	$32	41.9	55.5
Low-poverty school districts	$32	$41	16.2	16.1
All school districts	$32	$40		

SOURCE: White et al. forthcoming. Analysis of National Survey of State Directors of Vocational Education, Fiscal Data 1992 and 2001, and NCES, Common Core of Data (CCD).

[1]Statistics based on 29 states for which data were available in both 1992 and 2001 and in which more than 80 percent of grantee recipients in a state had an NCES ID.

[2]Poverty level approximated by the number of students within a district qualifying for free or reduced-price lunches. Low-poverty school districts are those with 0 to 9 percent of students receiving free or reduced-price lunches; medium-poverty school districts are those with 10 to 49 percent of students receiving free or reduced-price lunches; and high-poverty school districts are those with 50 percent or more of students receiving free or reduced-price lunches.

[3]The unit of analysis is a secondary student because most take at least one vocational education course. Therefore, the Perkins dollar amount in this table indicates the amount of federal money that is calculated per potential participant in secondary vocational education.

Several factors probably account for the weakening emphasis on poverty in the distribution of Perkins funds to local areas. First, flexibility options allow states to award some local grants without using the poverty-based funding formula (e.g., the 10 percent reserve fund and the waiver of the minimum allocation), and many states are using these provisions. Second, if either the number of students with disabilities or the number of adults in training programs is correlated with poverty, then eliminating these two criteria as weights in the local funding formula may have had a somewhat regressive effect.

Perkins funding is well-targeted to urban and rural school districts.

Historically, Congress has been sensitive to concerns that rural and urban areas are underserved or face greater challenges in providing high-quality vocational programs. The introduction of the reserve fund in Perkins III was designed partly to help address this issue in rural communities, as was the waiver of the minimum grant allocation. These provisions seem to have been successful in channeling more funds to rural grantees.

Compared to suburban districts, rural and urban districts received higher grant amounts on a dollar per student basis under both Perkins II and Perkins III (Table 5.12). By 2001,

Table 5.12
Average Perkins Grant Amounts per Secondary Student and Distribution of Perkins Funds, by Locale: 1992 and 2001[1]

	1992	2001		
Locale[2]	Perkins Dollar Amount per Secondary Student[3]	Perkins Dollar Amount per Secondary Student[3]	Percentage of Perkins Funds Received by Grantees	Percentage of Grantees
Urban school districts	$43	$50	37.9	7.5
Suburban school districts	$24	$30	37.7	33.2
Rural school districts	$39	$54	24.3	59.3
All school districts	$32	$40		

SOURCE: White et al. forthcoming. Analysis of National Survey of State Directors of Vocational Education, Fiscal Data 1992 and 2001, and NCES, Common Core of Data (CCD).

[1]Statistics based on 29 states for which data were available in both 1992 and 2001 and in which more than 80 percent of grantee recipients in a state had an NCES ID.

[2]The Common Core of Data classifies district locales as either a district that primarily serves a central city of a Metropolitan Statistical Area (MSA) (urban); a district that serves an MSA but not its central city (suburban); and a district that does not serve an MSA (rural).

[3]The unit of analysis is a secondary student because most take at least one vocational education course. Therefore, the Perkins dollar amount in this table indicates the amount of federal money that is calculated per potential participant in secondary vocational education.

rural LEAs received more per student ($54) than did urban ($50) or particularly suburban ($30) grantees.[24] However, because of their small size, rural districts received a small share of total Perkins local funding (24.3 percent) relative to the proportion of rural grantees (59.3 percent).

Small school districts are likely to receive more Perkins funding on a per student basis.

Small school districts are considered more limited in their ability to offer an array of vocational courses for students (see Chapter 2) and less able to take advantage of economies of scale in vocational programming. Although they received a small fraction of overall Perkins funding (2.8 percent) in 2001, districts with fewer than 500 students received a higher amount of Perkins funding per student ($88) than districts with more students ($53 and $37, respectively, for medium and large districts) (Table 5.13). Small districts

Table 5.13
Average Perkins Grant Amounts per Secondary Student and Distribution of Perkins Funds, by LEA Size: 1992 and 2001[1]

	1992	2001		
District Size[2]	Perkins Dollar Amount per Secondary Student[3]	Perkins Dollar Amount per Secondary Student[3]	Percentage of Perkins Funds Received by Grantees	Percentage of Grantees
Large school districts	$32	$37	79.0	33.6
Medium school districts	$34	$53	18.2	45.3
Small school districts	$37	$88	2.8	21.2
All school districts	$32	$40		

SOURCE: White et al. forthcoming. Analysis of National Survey of State Directors of Vocational Education, Fiscal Data 1992 and 2001, and NCES, Common Core of Data (CCD).

[1]Statistics based on 29 states for which data were available in both 1992 and 2001 and in which more than 80 percent of grantee recipients in a state had an NCES ID.

[2]Districts with 3,000 or more students were classified as large school districts; those with 500 to 2,999 students were classified as medium school districts; and those with 499 students or less were classified as small school districts.

[3]The unit of analysis is a secondary student because most take at least one vocational education course. Therefore, the Perkins dollar amounts in this table indicates the amount of federal money that is calculated per potential participant in secondary vocational education.

[24]The greater funding advantage for rural districts is consistent, however, with the fact that rural schools have a higher proportion of their students in vocational education than do urban or suburban schools (see Chapter 2).

also appear to be the primary beneficiary of the new reserve fund provision in Perkins III and were more likely to receive individual grants under the waiver of the minimum grant allocation than in previous years: the dollar per student amounts in small districts increased substantially from 1992 to 2001, more so than for other districts.

3. Use of Funds

Perkins III includes a long list of required and permitted activities and uses of funds for both state and local grantees.[25] Like its predecessor, the law was intended to support program improvement rather than the basic maintenance of programs, which was considered a state and local responsibility. Distinguishing between these two efforts is often quite difficult, but understanding the ways in which funds are spent provides some indication of the impact of Perkins III.

States spread their leadership funds to support a wide variety of required state activities.

Funding for state leadership activities was increased from 8.5 percent of the state allocation under Perkins II to 10 percent under Perkins III, partly to offset the elimination of the set-asides for gender equity activities. However, of the state leadership funds, $60,000 to $150,000 must be used to serve individuals preparing for nontraditional training and employment, and up to 1 percent can be set aside for vocational education in state correctional institutions. The remaining funds must be used for eight required leadership activities and may be used for 12 additional activities. When calculated as 10 percent of state allotments, the amounts available for state leadership in 2001 ranged from $421,492 in small states to just over $12 million in a large state like California (Table 5.2).

At least according to a survey of state directors, leadership funds are dispersed to cover many of the activities, particularly those that are required by law, with little emphasis on one activity or another (Table 5.14). By a small margin, a higher proportion of these funds are used at the secondary level for strengthening the integration of academic and vocational instruction. Case studies also suggest that, in practice, state leadership funds may be used to support the salaries of staff who carry out these activities (White et al. forthcoming).

[25]Section 135(b) specifies the required activities that local recipients must fund, and Section 135(c) delineates permissible activities. The menu of required activities is comprehensive and can be categorized in three areas: (1) strengthening instructional and programmatic approaches, including professional development; (2) improving and expanding quality programs, services, and technology; and (3) carrying out an evaluation of programs supported by Perkins funds, including how the needs of special populations are being met.

Table 5.14
Percentage of Perkins State Leadership Funds Spent for Secondary Vocational Education, by Activity: 2001

Activity	Percentage of State Leadership Funds[1]
Strengthening the integration of academic and vocational instruction	19.5
Improving data reporting and accountability	13.5
Expanding the use of technology in vocational programs	10.9
Promoting linkages between secondary and postsecondary vocational education	10.9
Supporting career guidance and counseling	8.5
Supporting programs for special populations leading to high-skill, high-wage careers	7.7
Preparing individuals for nontraditional training and employment	7.2
Supporting career and technical student organizations (formerly VSOs)	6.7
Other	15.1

SOURCE: White et al. forthcoming. Analysis of National Survey of State Directors of Vocational Education, 2001.

[1]The percentages of state leadership funds were weighted by the amount of state leadership money (10 percent of the state allocation) available for the 26 states that reported this information.

Perkins III may have led to fewer staff or targeted activities for gender equity, but the effects on students are unknown.

Perkins III introduced significant changes in how federal policy promotes the participation of both girls and boys in vocational education programs, particularly those that prepare students for nontraditional occupations. Prior to the new law, these gender equity activities were supported through two special legislative provisions: (1) a requirement that each state fund a gender equity coordinator and (2) set-aside funding streams amounting to 10.5 percent of each state's allocation, including programs for single parents and displaced homemakers. These provisions were replaced in 1998 with a requirement that states spend between $60,000 and $150,000 "for services that prepare individuals for nontraditional training and employment" (Section 112).

Even with fewer federal requirements, many states have continued to support gender equity and nontraditional training efforts, although the amount of time devoted to these activities appears to have declined. At least in 2001, about half of the states (23) reported having a gender equity coordinator to oversee activities directed at the secondary level (Table 5.15), and most had one or two staff members working at least partially on these issues. Although no comparable data from Perkins II are available, recent case studies conducted for NAVE suggest that there has been a reduction in the number of

Table 5.15
Number of States with Gender Equity and/or Special Populations Coordinators at the Secondary Level: 2001

Position	Number of States
Gender equity coordinator only	10
Special populations coordinator only	6
Both gender and special populations coordinator	13
None	15
Did not answer	2

SOURCE: White et al. forthcoming. Analysis of National Survey of State Directors of Vocational Education, 2001.
N=46 states

state-level staff assigned to gender equity (and other special populations) concerns (Stasz and Bodilly forthcoming). California, for example, has reduced the gender equity position from full- to part-time, and in Ohio, two gender equity positions have been largely phased out. Still, on average in 2001, states spent 7.2 percent of their state leadership funds on activities preparing students for nontraditional training, a figure comparable to what they spent supporting other special populations (7.7 percent) and career and technical student organizations, formerly known as vocational student organizations (VSOs) (6.7 percent).

Perkins III seems to have had a mixed effect on gender equity at the local level (Stasz and Bodilly forthcoming). On the one hand, changes in state staffing were not always apparent to local grantees, and sometimes other funding sources—including an increase in the size of the Perkins local grant—made up for the loss of targeted Perkins funds. On the other hand, some communities reduced programs or services that had been previously funded by the set-aside.

At the local level, Perkins funds are used mainly for equipment but also for other purposes.

Case studies indicate that local secondary programs use their Perkins grants to support a diverse set of efforts: career guidance materials or counselors, professional development for teachers, release time to work on articulation agreements, student internship programs, and other activities. But as under Perkins II, the primary use of Perkins III is to purchase equipment and materials (White et al. forthcoming). According to local Perkins coordinators, such a use of funds at least partly reflects the greater costs of providing vocational courses and the reality of tight budgets for technology in many districts.

C. Perkins State Grant Funding at the Postsecondary Level

Although there appeared to be less concern to enact major funding changes at the postsecondary level, the same philosophical principles that drove Perkins III funding provisions were applied to the postsecondary level. Congress sought to give greater flexibility in the use of funds and a higher share of funds to local grantees.

1. Basic Allocations and Use of Flexibility Provisions

State and local grantees face the same legislated requirements and choices for postsecondary vocational education as they do for secondary vocational education. As indicated in the previous section, the law mandates the local funding formula; it also specifies the maximum proportion of the state allocation that can be retained for state administration (5 percent) and state leadership (10 percent), amounts that must accommodate the oversight of both secondary and postsecondary grant making. Perkins III also includes funding options that states can take advantage of at the postsecondary level.

Nationally postsecondary vocational education continues to receive approximately the same share as it did early in Perkins II.

As noted in a previous section, states continued their historical distribution of Perkins funds between the postsecondary and secondary sectors. Nationally about the same proportion of local Perkins funds (38 percent) were allocated to postsecondary vocational education in 2001 as in 1992 (Table 5.4).

Local postsecondary grantees also appear to have received a higher share of funds under Perkins III than under Perkins II.

Not only secondary grantees but also postsecondary institutions benefited from the higher share of state funds that Perkins III required to be distributed to local grantees (85 percent, up from 75 percent under Perkins II). Postsecondary grants awarded under the new law are consistent with congressional intent, and the changes since Perkins II are similar to those among secondary grantees. Comparing grant awards reported by state directors in 1992 and 2001 indicates the following (Table 5.16):[26]

[26]Comparisons of grants between 1992 and 2001 are based on states that provided grant data in both years.

Table 5.16
Number and Amount of Postsecondary Grants Awarded: 1992 and 2001

Number and Amount of Grants	1992	2001	Difference	Percentage Change
Number of grants	996	1,065	69	6.9
Amount (grant size)				
Current dollars[1]	$226,019	$285,645	$59,626	26.4
Real dollars (2001)[2]	$286,592	$285,645	-$947	-0.3

SOURCE: White et al. forthcoming. Analysis of National Survey of State Directors of Vocational Education, Fiscal Data 1992 and 2001.

[1]Current dollars are the actual grant amounts as they were allocated and reported in the given year (1992 or 2001).
[2]Real dollars have been adjusted for a measure of inflation.

- ***The average grant size grew considerably.*** On average, the grant amount for postsecondary institutions increased by over one-quarter between Perkins II and Perkins III.

- ***There was no reduction in the number of postsecondary grants.*** States awarded slightly more postsecondary grants (6.9 percent) in 2001 than they did in 1992, so the average amount grantees received did not increase simply because funds were awarded to fewer institutions.[27]

- ***The increase in postsecondary grant size cannot be explained by a change in the secondary-postsecondary split or higher Perkins appropriations for basic grants.*** If states chose to designate a higher proportion of Perkins funds to postsecondary vocational education, then average postsecondary grant sizes could increase even without a higher share of funds going to the local level. But, in fact, the secondary-postsecondary split remained the same between Perkins II and Perkins III. Also, the increase in Perkins appropriations for basic grants during the period was only 15.3 percent,[28] compared to a 26.4 percent increase in postsecondary grant amounts; therefore, the higher grant amounts are not due solely to higher federal program budgets.

[27]State surveys show that most states approved all of the postsecondary applications they received for Perkins funds in FY 2001. Only three states rejected one or more of their grant applications.

[28]Overall Perkins appropriations may authorize a number of other relatively smaller vocational programs each year, not just the basic grant program and special reservations as presented in Table 5.2. When accounting for all programs authorized under Perkins, the budget increased 7.3 percent between 1992 and 2001 (analysis of historical budget statistics, U.S. Department of Education, Office of the Deputy Secretary, Budget Service).

- ***Purchasing power was more or less maintained.*** In real terms (adjusted for inflation), the average grant size in 2001 was almost equal to that in 1992.

- ***Average Perkins postsecondary grant amounts vary widely by state.*** The average state grant size at the postsecondary level deviated widely from the national average of $285,645 in 2001 (Table 5.17). The average ranged from a low of $70,645 in Tennessee to a high of $2,285,140 in Hawaii and $1,973,707 in Maine.[29] For the most part, states increased their Perkins grant amounts at the postsecondary level between 1992 and 2001. Only five states (California, Iowa, Minnesota, North Dakota, and South Dakota) decreased their average grant size during the period.

Table 5.17

Average, Maximum, and Minimum Postsecondary Grant Amounts, by State: 2001

State	Average Grant	Change from 1992[1]	Maximum Grant	Minimum Grant
National Average	$285,645	+	$4,832,430	$1,025
Tennessee	$70,645	+	$201,300	$26,600
Ohio	$91,084	+	$335,065	$28,050
Montana	$111,996	+	$204,180	$54,061
Arkansas	$115,288	+	$223,805	$52,202
Connecticut	$123,711	+	$184,175	$72,783
Oklahoma	$125,427	+	$292,354	$48,852
Alaska	$127,330	n/a	$184,275	$93,439
North Dakota	$127,839	–	$328,162	$1,352
Virginia	$137,630	n/a	$418,944	$50,000
Kansas	$151,331	+	$405,891	$51,690
South Carolina	$158,481	+	$351,224	$45,972
Louisiana	$167,455	+	$1,616,381	$52,803
West Virginia	$173,505	+	$355,116	$95,181
Wyoming	$177,378	n/a	$279,014	$97,757
New Hampshire	$193,044	n/a	$291,782	$30,669
Alabama	$198,916	+	$558,991	$72,066
New Jersey	$209,413	n/a	$606,229	$1,025
Pennsylvania	$222,648	+	$1,620,096	$44,363
Kentucky	$235,850	+	$599,516	$95,847
Vermont	$236,504	+	$382,150	$130,622

Table continued on following page

[29]Hawaii and Maine were the only two states that awarded just one Perkins grant each at the postsecondary level. Of states that awarded more than one grant to postsecondary institutions or consortia, Wisconsin had the highest average grant size ($549,267).

Table 5.17—continued

Average, Maximum, and Minimum Postsecondary Grant Amounts, by State: 2001

State	Average Grant	Change from 1992[1]	Maximum Grant	Minimum Grant
Arizona	$246,615	+	$840,683	$110,398
Massachusetts	$266,556	+	$492,892	$64,079
Maryland	$271,075	+	$1,015,893	$42,197
New Mexico	$274,703	+	$1,464,811	$63,448
Utah	$284,340	+	$1,115,319	$8,000
Missouri	$290,978	+	$1,316,712	$60,579
Washington	$297,578	+	$1,360,944	$65,310
Iowa	$299,652	–	$692,196	$77,311
New York	$313,510	+	$1,472,275	$55,852
Idaho	$316,451	+	$572,433	$162,861
Illinois	$336,405	+	$3,642,996	$79,165
Colorado	$348,454	+	$885,294	$75,354
Georgia	$363,478	+	$1,189,149	$87,936
Nevada	$373,857	+	$846,572	$104,866
Florida	$384,061	+	$3,787,602	$51,977
Minnesota	$392,891	–	$1,568,000	$75,772
California	$393,154	–	$4,832,430	$43,746
South Dakota	$393,251	–	$669,646	$23,713
Mississippi	$396,133	+	$1,098,349	$142,643
Nebraska	$400,833	+	$747,358	$152,803
Texas	$538,625	+	$2,199,000	$54,000
Wisconsin	$549,267	+	$2,553,540	$114,600
Maine	$1,973,707	+	$1,973,707	$1,973,707
Hawaii	$2,285,140	n/a	$2,285,140	$2,285,140
Delaware	n/a	n/a	n/a	n/a
Indiana	n/a	n/a	n/a	n/a
Michigan	n/a	n/a	n/a	n/a
North Carolina	n/a	n/a	n/a	n/a
Oregon	n/a	n/a	n/a	n/a
Rhode Island	n/a	n/a	n/a	n/a

SOURCE: White et al. forthcoming. Analysis of National Survey of State Directors of Vocational Education, Fiscal Data 1992 and 2001.

[1]Statistics based on 38 states for which postsecondary grantee-level data were available in both 1992 and 2001.

n/a = not available or missing data.
+ = average grant size increased between 1992 and 2001.
– = average grant size decreased between 1992 and 2001.

The percentage of eligible postsecondary institutions receiving Perkins funding seems to have increased somewhat between 1992 and 2001.

Postsecondary institutions were more likely to receive a grant in 2001 under Perkins III (83.3 percent) than in 1992 under Perkins II (75.8 percent) either as individual grantees or as part of a consortium (Table 5.18). These computed proportions likely overstate the actual magnitudes because the denominators are based only on public and private two-year and less-than-two-year postsecondary institutions and tribally controlled colleges, while Perkins grantees can also include four-year colleges and universities and private, nonprofit institutions that offer occupational certificate or two-year degree programs. However, there is little reason to believe that the extent of the change over time is biased.

Table 5.18
Percentage of Postsecondary Institutions Awarded Perkins Grants[1]: 1992 and 2001

Postsecondary Sector	1992	2001
Eligible individual postsecondary institutions	75.8	83.3

SOURCE: White et al. forthcoming. Analysis of National Survey of State Directors of Vocational Education, Fiscal Data 1992 and 2001, and NCES, Integrated Postsecondary Education Data System (IPEDS).

[1]Number of grants are based on the 38 states that reported in both years (1992 and 2001).

Local Perkins funding for postsecondary education primarily went to public two-year colleges in 2001.

While a variety of institutions are eligible for Perkins funding,[30] states are most likely to allocate these funds to public two-year or public less-than-two-year colleges (Table 5.19). States allocated more than two out of three local Perkins dollars to public two-year colleges in FY 2001, of which there are just over 1,000 nationally. Public less-than-two-year postsecondary institutions, numbering a total of 240 nationwide, received the second largest share of postsecondary Perkins funds (20.2 percent).[31] Four-year colleges, adult schools, and private nonprofit colleges received much smaller shares of Perkins funds,

[30]Perkins III defines eligible institutions as public and nonprofit institutions of higher education (as defined in Title IV of the Higher Education Act); BIA-funded colleges or tribally controlled colleges; and adult institutions that offer vocational programs.

[31]To maintain comparability, the number of public two-year and public less-than two-year colleges are summed for the 38 states that reported grant information in 2001. There are 1,007 public two-year colleges in these states (1,197 for all states) and 240 public less-than-two-year colleges (261 for all states).

Table 5.19
Percentage of Local Postsecondary Perkins Funds Allocated, by Institution/Program Type: 2001

Institution/Program Type	Percentage of Local Postsecondary Perkins Funds
Public two-year colleges	67.6
Public less-than-two-year postsecondary institutions	20.2
Public four-year colleges	4.3
Area or regional schools	3.9
Other	4.0
Tribally controlled colleges	0.4
Adult schools	0.3
Private nonprofit colleges	0.1
Not otherwise classified	3.2

SOURCE: White et al. forthcoming. Analysis of National Survey of State Directors of Vocational Education, 2001.

probably because the relatively small size of their vocational programs did not qualify them under the funding formula and the $50,000 minimum grant allocation.[32]

Fifteen federally recognized tribal colleges and universities received Perkins grants in 2001.

The federal government recognized 32 tribal colleges and universities in 2001,[33] and all of them were eligible to receive Perkins grants (White House Initiative on Tribal Colleges and Universities 2002). Six states reported providing postsecondary Perkins grants to 15 of these institutions, for a total of $1,074,518 in FY 2001 (White et al. forthcoming). This total translates to roughly $70,000 per college, an amount that falls considerably below the national average of $285,645 for postsecondary grantees.

Local grants made under the funding formula are supplemented in two ways, however. Perkins III (as did Perkins II) authorizes a relatively small program (for example, $5.6 million in FY 2001) for tribally controlled postsecondary vocational and technical insti-

[32]Fifteen states indicated that they had postsecondary institutions that did not qualify for funding under Perkins III. However, states may waive consortium requirements to provide local grants that are less than the minimum of $50,000 to postsecondary institutions located in rural, sparsely populated areas. Five states waived consortium requirements for postsecondary institutions.

[33]To maintain comparability with Perkins grant data in 2001, information about tribal colleges and universities focused on the same year. Two additional tribal colleges and universities have been federally recognized since 2001.

tutions for program operations and institutional support. In addition, the 1.25 percent federal set-aside for Native Americans provides assistance through competitive grants primarily to tribally controlled and Alaska Native colleges, universities, and organizations.

States are less likely to take advantage of the options for funding flexibility at the postsecondary level than at the secondary level.

A number of states (20) used at least one of three main options,[34] as discussed below, for funding flexibility at the postsecondary level in 2001, compared to 29 states at the secondary level (Table 5.20).

- ***Reserve Fund:*** The most common option adopted was the reserve fund. Seven of the 11 states drawing upon the reserve fund reported using the full 10 percent allowed, and they were equally likely to distribute these funds across the legislated eligible categories.

- ***Formula Waiver:*** Eleven states received a waiver for the legislated funding formula at the postsecondary level (based on the number of Pell grant recipients) in order to use an alternative that more effectively targets high-poverty areas. In comparison, no state received a formula waiver at the secondary level.

- ***Consortium Requirement Waiver:*** Only five states reported that they had waived consortium requirements to award grants that are less than the $50,000 minimum for some postsecondary grantees in FY 2001. Four states did so to serve rural, sparsely populated areas, while the fifth aimed to serve a high number of disadvantaged students (White et al. forthcoming).[35]

Table 5.20
Number of States Using Perkins Funding Flexibility Provisions: 2001

Postsecondary Sector	Reserve Fund	Formula Waiver	Consortium Requirement Waiver[1]	Any Flexibility Option
States	11	11	5	20

SOURCE: White et al. forthcoming. Analysis of National Survey of State Directors of Vocational Education, 2001.

[1]Five states reported that they received a waiver to relax consortium requirements to award grants that are less than $50,000 each to postsecondary institutions in rural, sparsely populated areas.

[34]Five states were eligible for the minimal allocation rule, but only two states exercised it (see discussion in footnote 19).

[35]Five states reported that they had made a minimum grant allocation waiver in FY 2001 based on a national survey of states. However, an analysis of fiscal data collected from states revealed eight states awarded a grant that was less than $50,000 (White et al. forthcoming).

2. Use of Funds

The legislated list of required and permitted activities and uses of funds applies to postsecondary efforts as well as those targeted to the secondary level. For postsecondary grantees, too, Perkins III emphasizes improving programs rather than just maintaining them.

Like the funds directed at the secondary level, state leadership funds used for postsecondary vocational education are spread widely across activities.

According to a survey of state directors, Perkins funds spent on postsecondary state leadership activities were dispersed across the required activities specified in the law and a small set of permissible activities (Table 5.21).[36] The top three uses of state leadership funds—expanding technology, strengthening integration, and improving accountability reporting—are consistent with the priority uses at the secondary level (see Section B). Case studies found that, in particular, a large share of postsecondary leadership funds were supporting the salaries of staff helping to develop and implement data-reporting procedures and systems (White et al. forthcoming).

Promoting nontraditional training and employment is a relatively prominent part of state postsecondary efforts, with over 8 percent of postsecondary state leadership funds being spent on these activities. Eighteen states have a gender equity coordinator working at least part-time on these activities at the postsecondary level (Table 5.22).

Local postsecondary Perkins funds are generally used for staffing and support services.

Perhaps even more so than at the secondary level, the ways in which local postsecondary grantees spend their Perkins grants vary substantially. Moreover, in contrast to secondary grantees, postsecondary institutions are far less likely to use Perkins funds for equipment and other supplies, perhaps because community colleges have more substantial and routine budgets to fund technology upgrades and their need to meet employer expectations depends more closely on whether their training technology is up-to-date (White et al. forthcoming). According to case studies, grantees by and large, use local Perkins postsecondary funds to cover administrative costs for staffing "coordinator" positions (i.e., special populations, gender equity, data systems) and to provide support services for vocational students in their institutions.

[36]As noted in Section B, funding for state leadership activities increased from 8.5 percent of the state allocation under Perkins II to 10 percent under Perkins III, with a requirement that $60,000 to $150,000 be used to support individuals preparing for nontraditional training and employment and up to 1 percent be set aside for vocational education in state correctional institutions. When calculated as 10 percent of state allotments, in 2001 the amounts available for state leadership ranged from $421,492 in small states to just over $12 million in a large state like California (Table 5.2).

Table 5.21

Percentage of Perkins State Leadership Funds Spent for Postsecondary Vocational Education, by Activity: 2001

Activity	Percentage of State Leadership Funds[1]
Expanding the use of technology in vocational programs	17.9
Strengthening the integration of academic and vocational instruction	15.3
Improving data reporting and accountability	15.1
Supporting programs for special populations leading to high-skill, high-wage careers	12.9
Preparing individuals for nontraditional training and employment	8.2
Promoting linkages between secondary and postsecondary vocational education	7.7
Supporting career guidance and counseling	5.8
Supporting career and technical student organizations (formerly VSOs)	2.3
Other	14.8

SOURCE: White et al. forthcoming. Analysis of National Survey of State Directors of Vocational Education, 2001.

[1]The percentages of state leadership funds were weighted by the amount of state leadership money (10 percent of the state allocation) available for the 26 states that reported this information.

Table 5.22

Number of States with Gender Equity and/or Special Populations Coordinators at the Postsecondary Level: 2001

Position	Number of States
Gender equity coordinator only	6
Special populations coordinator only	5
Both gender and special populations coordinator	12
None	13
Did not answer	10

SOURCE: White et al. forthcoming. Analysis of National Survey of State Directors of Vocational Education, 2001.

N=46 states

D. Perkins Tech-Prep Grant Funding

Tech-Prep was first established in 1990 (Perkins II) as a separate program to promote "two-plus-two" technical programs of study (see Chapter 4). Since that time, appropriations for the program—about 10 percent of the total amount for Perkins—have increased somewhat. Because the formula for state Tech-Prep allotments remained unchanged between 1992 and 2001, these state grants increased as well (Table 5.23).[37]

Table 5.23
Amounts for Tech-Prep State Grant Allotments: 1992 and 2001

State	1992	2001
Alabama	$1,808,501	$1,995,785
Alaska	$160,609	$336,753
Arizona	$1,448,578	$1,987,848
Arkansas	$1,004,895	$1,186,934
California	$9,357,339	$11,895,013
Colorado	$1,119,563	$1,420,073
Connecticut	$880,622	$869,581
Delaware	$217,099	$440,480
District of Columbia	$179,938	$321,892
Florida	$4,063,397	$5,075,903
Georgia	$2,616,728	$3,102,535
Hawaii	$358,614	$530,000
Idaho	$435,623	$652,082
Illinois	$3,665,308	$4,054,595
Indiana	$2,228,749	$2,465,494
Iowa	$1,042,639	$1,245,235
Kansas	$874,276	$1,120,100
Kentucky	$1,626,968	$1,863,661
Louisiana	$1,879,665	$2,190,094
Maine	$459,176	$530,000
Maryland	$1,343,891	$1,575,660
Massachusetts	$1,704,461	$1,658,556
Michigan	$3,395,318	$3,768,685
Minnesota	$1,475,885	$1,736,576
Mississippi	$1,209,134	$1,390,909
Missouri	$1,863,805	$2,217,159
Montana	$317,518	$519,374
Nebraska	$578,707	$709,518

Table continued on following page

[37]The formula for state Tech-Prep allotments is identical to that for the basic state grants under Perkins.

Table 5.23—continued

Amounts for Tech-Prep State Grant Allotments: 1992 and 2001

State	1992	2001
Nevada	$379,529	$576,717
New Hampshire	$328,238	$530,000
New Jersey	$2,068,361	$2,192,627
New Mexico	$644,953	$843,258
New York	$5,153,396	$5,246,770
North Carolina	$2,785,654	$2,995,591
North Dakota	$269,429	$376,267
Ohio	$4,069,951	$4,449,520
Oklahoma	$1,307,304	$1,587,998
Oregon	$1,014,963	$1,299,575
Pennsylvania	$4,071,449	$4,238,522
Rhode Island	$354,695	$530,000
South Carolina	$1,593,356	$1,738,505
South Dakota	$282,514	$426,704
Tennessee	$2,037,127	$2,233,311
Texas	$6,992,837	$8,495,203
Utah	$818,698	$1,226,873
Vermont	$214,951	$352,887
Virginia	$2,104,071	$2,445,828
Washington	$1,628,578	$2,091,644
West Virginia	$783,267	$877,270
Wisconsin	$1,805,496	$2,128,276
Wyoming	$182,117	$280,263
Reservations for Territories, Outlying Areas, and Other		
American Samoa	0	0
Guam	0	0
Northern Mariana Islands	0	0
Puerto Rico	$1,742,268	$1,921,202
Virgin Islands	$49,792	$54,694
Palau	0	0
Marshall Islands	0	0
Micronesia	0	0
Indian Tribe Set Aside	0	0
Other	0	0
Total	$90,000,000	$106,000,000

SOURCE: U.S. Department of Education, Office of Vocational and Adult Education (Program Memorandum: Vocational-Technical Education State Allotments for Fiscal Year 2001 Appropriations, February 2001); and U.S. Department of Education, Office of the Deputy Secretary, Budget Service. *State Funding History Tables by Program.* http://www.ed.gov/about/overview/budget/history/index.html?src=rt (accessed Nov. 15, 2003).

The same local institutions that receive funds under Title I (state grants) may receive funds under Tech-Prep, Title II—school districts, area vocational centers, community colleges, and other postsecondary institutions; however, they do so according to a different structure. Perkins III (and its predecessor) mandates that states award Tech-Prep grants to local consortia, entities that must include at least one secondary district or area vocational school and at least one postsecondary institution, with the emphasis on two-year degree-granting institutions. These consortia vary significantly in size, with about a third involving five or more school districts and multiple postsecondary institutions (Hershey et al. 1998). Some consortia may receive multiple grants, in states where Tech-Prep grants are project-based rather than, or in addition to, organized by geographic area.

States have complete discretion over how they allocate Tech-Prep (Title II) grants and rarely take poverty into consideration.

Perkins III gives states considerable flexibility in shaping many features of their Tech-Prep grant programs. State agencies have the latitude to determine the number and duration of grants awarded, their purpose (planning or implementation), and how consortia will be configured (see Chapter 4 for more details).

Unlike the basic Perkins grant, however, states also choose whether to award Tech-Prep grants on a formula or competitive basis. Most use a formula, either solely or in combination with a competitive process for some grants (Table 5.24). However, in contrast to the ways in which most Perkins funds are allocated, few states use poverty as a criterion in awarding Tech-Prep funds to local consortia (Table 5.25). Thus, the methods states use to allocate Tech-Prep funds appear to be inconsistent with the compensatory emphasis of the Perkins Act.

Table 5.24
Number of States Using Various Methods to Award Grants to Local Tech-Prep Consortia: 2001

Method Used	Number of States
By formula	21
Through a competitive process	14
Through a combination of formula and competition	6
Other	5

SOURCE: White et al. forthcoming. Analysis of National Survey of State Directors of Vocational Education, 2001.
N=46 states

Table 5.25

Factors States Used in Formulas for Awarding Local Tech-Prep Grants: 2001

State	Base Amount to All Consortia	Number of Vocational Students	Number of Secondary Students	Number of Secondary Schools	Number of Tech-Prep Students	15- to 19-Year-Olds in Poverty	15- to 19-Year-Olds	Pell Formula	Other
Arkansas									Performance-based on number of completers
Florida					✓				Number of articulated programs
Illinois	✓								Number of teachers; number of sites
Kentucky									>25 percent to postsecondary level
Louisiana	✓								Reviewer ratings
Montana	✓				✓				Number of counties
Nebraska	✓							✓	Tribal colleges
Nevada	✓				✓				
New Hampshire	✓								
North Dakota	✓				✓				
Ohio	✓		✓						
Pennsylvania						✓	✓		
South Carolina	✓	✓							
Texas	✓		✓						
Washington	✓				✓				
Wisconson	✓		✓	✓					Only 10th-grade students counted

SOURCE: White et al. forthcoming. Analysis of National Survey of State Directors of Vocational Education, 2001.

A "✓" represents states that reported using these factors for their local Tech-Prep funding formulas.
A blank cell represents states that did not use these factors.

Nationally grants to local Tech-Prep consortia are similar in size to secondary basic grants.

Generally Tech-Prep consortia include, and Perkins grants must cover, multiple districts. In 2001, the size of the typical Perkins Tech-Prep consortium grant ($111,089; Table 5.26) was about the same as the typical basic secondary grant ($101,813). However, consortium grant amounts varied widely across states depending on, among other factors, the number of grants awarded (Table 5.27).

Table 5.26

Number of Tech-Prep Consortium Grants and Average Grant Amounts: 1994, 1996, and 2001

Grant Year	Average Consortium Grant Amount	Number of Grants Awarded
1994	$117,273	953[1]
1996	100,148	1,029[1]
2001	111,089	738[2]

SOURCE: White et al. forthcoming. Analysis of National Survey of State Directors of Vocational Education, 2001; and National Tech-Prep Evaluation.

[1]N=50 states
[2]N=40 states

Table 5.27

Average, Maximum, and Minimum Size of Tech-Prep Grants Awarded to Grantees and Number of Grantees, by State: FY 2001

State	Average Grant	Maximum Grant	Minimum Grant	Number of Grants Awarded
National Average	$111,089	$795,553	$1,000	738
Wyoming	$27,159	$40,677	$16,900	10
Colorado	$27,524	$43,000	$1,000	50
Kentucky	$37,393	$163,225	$12,000	40
Minnesota	$53,200	$162,207	$22,741	34
North Dakota	$55,153	$83,627	$23,823	4
Vermont	$56,410	$315,250	$10,000	9
Maryland	$64,368	$100,440	$14,722	21
Iowa	$66,413	$86,862	$58,557	15
Oklahoma	$69,600	$200,000	$33,563	25
Connecticut	$73,727	$156,476	$9,750	11
Alabama	$77,193	$189,190	$42,560	24
Washington	$86,466	$110,000	$70,000	22
Virginia	$89,652	$208,500	$84,250	23

Table continued on following page

Table 5.27—continued

Average, Maximum, and Minimum Size of Tech-Prep Grants Awarded to Grantees and Number of Grantees, by State: FY 2001

State	Average Grant	Maximum Grant	Minimum Grant	Number of Grants Awarded
Illinois	$91,140	$208,109	$7,500	43
South Dakota	$94,715	$115,735	$84,900	4
Arkansas	$96,219	$203,870	$45,869	12
West Virginia	$97,313	$131,000	$52,500	10
New Jersey	$99,813	$100,000	$98,442	19
New Hampshire	$100,000	$100,000	$100,000	5
Montana	$102,880	$117,497	$97,562	5
Idaho	$103,395	$129,703	$80,358	6
Arizona	$112,901	$154,855	$77,290	6
Tennessee	$115,007	$142,737	$95,017	13
California	$117,647	$289,081	$71,000	91
New Mexico	$118,164	$141,000	$78,285	7
Alaska	$118,250	$151,909	$97,438	3
Mississippi	$123,906	$123,906	$123,906	15
Wisconsin	$127,899	$172,927	$90,652	16
Massachusetts	$131,302	$190,000	$79,500	12
Utah	$134,479	$431,233	$40,000	10
Nevada	$138,054	$222,608	$106,270	4
Louisiana	$149,213	$160,655	$100,000	14
Ohio	$156,548	$446,404	$72,825	26
Florida	$172,218	$352,463	$40,649	28
South Carolina	$172,739	$264,393	$117,892	16
Missouri	$190,258	$355,148	$177,574	14
New York	$191,442	$200,000	$100,000	27
Pennsylvania	$255,860	$789,810	$48,061	17
Texas	$297,522	$795,553	$216,912	26
Hawaii	$530,000	$530,000	$530,000	1
Delaware	n/a	n/a	n/a	n/a
Georgia	n/a	n/a	n/a	n/a
Indiana	n/a	n/a	n/a	n/a
Kansas	n/a	n/a	n/a	n/a
Maine	n/a	n/a	n/a	n/a
Michigan	n/a	n/a	n/a	n/a
Nebraska	n/a	n/a	n/a	n/a
North Carolina	n/a	n/a	n/a	n/a
Oregon	n/a	n/a	n/a	n/a
Rhode Island	n/a	n/a	n/a	n/a

SOURCE: White et al. forthcoming. Analysis of National Survey of State Directors of Vocational Education, Fiscal Data 2001.

n/a = not available or missing data.
N=40 states

NOTE: Statistics based on actual grant amounts awarded, not on the total grant amount received by a consortium.

E. Perkins Accountability Systems and Their Implementation

Perkins III represented a clear attempt by policymakers to make accountability requirements stronger than those under the previous law. Perkins III specified four core indicators of performance and mandated that states (1) identify appropriate measures and establish quantifiable levels of performance for each of them, using the definitions listed in Table 5.28; (2) track progress of the measures over time; and (3) report performance results to ED, both for students in vocational programs overall and for key subgroups or special populations. In addition, the law included sanctions and incentives for states based on their performance (see Table 5.3 for a more detailed overview of the new provisions).[38]

Table 5.28
Key Accountability Terms

- Performance *indicator*: a measurable aspect of student performance (e.g., academic skill attainment).
- Performance *measure*: how an indicator is to be assessed quantitatively (e.g., percentage of students who achieve a certain level on the statewide academic assessment).
- Performance *standard*: criterion against which actual performance on the measure is to be evaluated; provides the actual percentage and performance level expected in specific, quantifiable terms (e.g., exact score on the assessment that will be used to calculate "proficiency" in math or English).
- *Validity*: how well a measure relates to or aligns with the indicator of interest.
- *Reliability*: the consistency or stability of a measure from one person or year to the next.

According to Section 113(a), the purpose of the accountability system was to

> *. . . establish a State performance accountability system . . . to assess the effectiveness of the State in achieving statewide progress in vocational and technical education, and to optimize the return of investment of Federal funds in vocational and technical education activities.*

Given this intent, Congress gave states sole authority and, therefore, wide latitude in choosing measures and setting initial performance levels and targets (Section

[38]The incentives were included in the Workforce Investment Act of 1998 (WIA); states could receive a financial bonus if they met or exceeded performance targets for programs under WIA, Title I, Adult Education, and Perkins.

113(b)(2)(D)). Section 324 of the law limited ED from issuing regulations regarding Perkins accountability. Instead, ED's Office of Vocational and Adult Education convened a series of technical assistance meetings to educate states about their options and to encourage consensus on measurement where possible.

At the same time, the law required ED to issue "state-by-state comparisons" of their performance data. However, any expectations that these comparisons would provide a national picture of vocational education performance are in conflict with the law's emphasis on state management of accountability. The autonomy under Perkins III is comparable to that given states in the No Child Left Behind Act but distinct from the more clearly specified federal accountability requirements established in the Adult Education and Family Literacy Act, Title I of WIA, and Title I of the Vocational Rehabilitation Act.

When compared to performance measurement and reporting under Perkins II, state vocational officials have made serious commitments to these efforts and considerable progress in implementing them. Challenges remain, however, in creating state-based vocational accountability systems with valid and reliable data that can be used for program management and that do not impose undue burdens on either state or local grantees.

1. Quality of Performance Measurement: Validity and Reliability

Data quality covers a broad range of issues related to the validity, reliability, and accuracy of information gathered. For accountability systems to actually promote change, the data collected must be valid and well-aligned with the type of performance that is to be improved. To use these systems appropriately for decision making, the data must be reliable and accurate—for example, consistent in their student coverage (how states and local programs determine which "vocational students" they will count and track) and in their procedures for monitoring student progress (e.g., record matching or survey response rates).

Certainly in the aggregate, nationally Perkins reporting does not have these qualities, but even the state systems face considerable barriers to establishing high-quality accountability systems. Most state and local officials interviewed during the case studies conceded that the quality of their Perkins data needed improvement (White et al. forthcoming). In some instances, state directors noted problems with the collection of data on most or all of the indicators. Some attributed poor data quality to rudimentary local data collection systems that depend heavily on hand counts, while others pointed to the time required to establish complex data collection systems and train local staff in their purpose and use. Still others indicated that differences in record-keeping practices, staff expertise, and

the structure of vocational programs at the local level affected data quality adversely. Poor data quality may also be attributable to the inclusion of a large number of local practitioners (school district and school personnel as well as community college administrators) who typically bear the brunt of data collection and reporting responsibilities. Moreover, efforts to ensure reliability often collide with validity; for example, guided by ED, many states chose to use statewide academic assessments because of their reliability, even if the assessments were offered in too early a grade to be a valid indicator of vocational program outcomes.

States measure performance in many different ways, prohibiting national comparisons even if Congress wanted them.

As permitted in the law, the accountability system in Perkins III is inconsistent in its definitions of indicators and data collection strategies across states, thus limiting the potential to make national comparisons. Based on state reporting to ED, there are currently between two and seven different ways that states measure each Perkins indicator (Table 5.29). Even where there appears to be some commonality—for example, in use of national or state assessments to measure academic skill attainment—there are differences in the cut scores on the same test across states. In addition, states also vary in the extent to which their assessments are "high-stakes" versus diagnostic, which can create quite different standards for passing and lead to pass rates in states that range from less than 10 percent to nearly 100 percent.

The diversity reflects the roles of federal and state staff in developing state accountability systems, the limited number of ways to measure certain indicators, and the unique circumstances and program environments in which Perkins operates at the state and local levels. Both state administrators and local practitioners acknowledged that the processes used to collect and compile Perkins data vary significantly by indicator (White et al. forthcoming). This lack of consistency across states, however, matters less than issues of validity and reliability in measurement within states.

Some Perkins measures do not accurately gauge the type of student performance sought, which creates a validity problem.

Building an accountability system that balances state flexibility, utility, and burden has proved challenging. In aiming to achieve that goal, state systems have often, sometimes with federal guidance, compromised the validity of their measures—that is, the extent to which the measures match the outcomes federal law and state interpretation promote (White et al. forthcoming). For example:

Table 5.29

Number of States Adopting Various Measurement Approaches for Reporting Secondary and Postsecondary Vocational Education Performance: 2001

Indicator	Number of States[1]	
State Measurement Approach	Secondary	Postsecondary
Academic skill attainment		
National/state academic assessment	34	7
High school graduation	12	
Academic GPA	4	11
Academic course completion	2	9
Overall GPA	2	11
Program completion		13
Vocational course completion		3
Vocational/technical skill attainment		
National/state standards and assessment systems	16	4
Local assessment systems	13	11
Vocational/technical GPA	10	15
Vocational/technical course completion	8	7
Program completion	7	16
State/local administrative data		2
Overall GPA		1
Completion		
High school graduation	49	
Vocational/technical program completion	3	10
High school graduation, plus follow-up	1	
Degree or credential		40
Degree, credential, or vocational/technical course		2
Degree, credential, or transfer		1
Degree, credential, or follow-up		1
Placement		
State-developed, school-administered surveys/ placement surveys	33	31
Administrative record exchanges/matching	11	24
Local assessment systems	4	
State-developed and administered surveys	4	2
National/state standards and assessment	1	
High school graduation	1	

Table continued on following page

Table 5.29—continued

Number of States Adopting Various Measurement Approaches for Reporting Secondary and Postsecondary Vocational Education Performance: 2001

Indicator	Number of States[1]	
State Measurement Approach	Secondary	Postsecondary
Retention		
Administrative record exchanges/matching		33
State-developed, school-administered surveys/ placement records		23
State-developed and administered surveys		1
Participation in nontraditional programs		
State/local administrative data	51	52
State-developed, school-administered surveys/ placement records	1	
Local assessment systems	1	1
Completion of nontraditional programs		
State/local administrative data	52	52
Local assessment systems	1	1

SOURCE: White et al. forthcoming. Analysis of Perkins performance data, U.S. Department of Education, Office of Vocational and Adult Education, 2001.

[1]Includes the 50 states, plus the District of Columbia, Guam, and Puerto Rico.

NOTE: Some states use more than one measurement approach for an indicator, so the number of states per indicator may sum to more than 53.

- ***Student academic attainment:*** ED encouraged the use of statewide academic assessments as a measure of students' academic attainment because of the reliability of those measures. However, many state assessments are administered in the 10th grade even though most vocational course taking occurs later in high school; thus, the measure is more a reflection of the achievement of students attracted to vocational education than an outcome associated with their actual participation. At the postsecondary level, many states use students' GPA to measure their attainment in a certificate or degree program, even though those programs may have little academic content.

- ***Completion:*** Congress's inclusion of the secondary completion indicator reflects an expectation that vocational education would help students graduate from high school. However, because the definition of a vocational student in most states requires a student to have completed three or more yearlong vocational courses,

only the graduation status of those students who have remained in high school long enough to meet this definition are counted; students who drop out of high school typically do not accumulate enough credits in vocational education to be included in this and other measures.

Similarly, states did not view the postsecondary completion rate as a very meaningful measure of performance in college because many students enroll in only the specific courses they need to get a job or promotion and, according to state and local officials, these students do not intend to earn a credential.[39] In narrowing the group of students to be included in this measure, however, some states set a lower threshold (i.e., only those who have earned at least 12 credits); in contrast, other states set a higher threshold (only those who attend full-time or who earn 50 or more credits), thus ensuring that a higher proportion of the included students would inevitably complete a degree or certificate. A few states have included not only those who complete a degree or certificate program but also those who may not have done so but did meet other credit or GPA standards (White et al. forthcoming).

- ***Participation in and completion of nontraditional programs:*** Perkins III defines "nontraditional training and employment" as occupations or fields of work in which individuals from one gender make up less than 25 percent of the individuals employed in each such occupation or field of work (Section 3(17)). Although probably intended to promote the goal of encouraging female students to pursue male-dominated jobs that pay high wages, this indicator may also encourage males to enter training for female-dominated jobs with lower wages.

Within states, local programs may not use consistent definitions, measures, or data collection strategies, leading to substantial concerns about reliability.

Even more important for the quality of the overall system, substantial variation exists within many states in how local programs collect and report performance data (White et al. forthcoming). There are differences not only across local communities but also from year to year within a community (and therefore within a state), depending on who is responsible for overseeing the data collection efforts. These inconsistencies within states partly reflect a desire to maintain local flexibility but, at the same time, make it difficult for the states to track and compare local program performance in a reliable manner. To some extent, the reliability problems may diminish when states and local vocational

[39]See Chapter 3 for a discussion of postsecondary student objectives and completion rates.

educators become more accustomed to the measures and definitions, but there are currently several indicators for which the accuracy and consistency of data are a particular concern:

- ***Vocational-technical skill attainment:*** Few states have any direct measure of whether students have attained proficiency in their knowledge of vocational-technical subject matter. Even in states that provide a common tool (typically a list of competencies), the tool provides little or no assurance of consistent, comparable reporting. In one state, for example, local data collection methodologies ranged from teacher ratings and completion of competency profiles to student self-assessment and completion of these profiles.

  Many other states use questionable proxies, such as class grades or course completion, to measure whether students have mastered a vocational subject. A number of states report using industry certifications as a measure of vocational skill attainment, but where the certification exams are provided by a third party (e.g., Microsoft), information on pass rates may not be collected systematically. In case studies, several states reported moving toward industry certification, but none described concrete plans or timelines for doing so. Several also noted the absence of widely recognized industry credentials in many vocational areas.

- ***Academic skill attainment:*** In states that have not chosen to use statewide assessments, many different interpretations and levels of performance are possible in local reporting. At least eight states are using secondary GPA or course completion—approaches that would not qualify as sufficiently reliable under the No Child Left Behind Act. According to ED, one state is using community college placement tests to assess whether high school vocational students meet academic standards, but each community college can set its own passing score. These consistency problems are also evident in the reporting of academic attainment for postsecondary vocational students, for which most states use locally or program-determined GPA or course or program completion as the measure.

- ***Placement and retention:*** More than 30 states at both the secondary and postsecondary levels use state or local surveys to obtain information on placement and retention (Table 5.29). Within states, local survey data are often not comparable across communities in the amount of time that has elapsed between graduation and data collection (i.e., the follow-up period used). In addition, response rates in any year can range from 17 percent to almost 90 percent, raising questions about the coverage of this performance measure and making year-to-year comparisons problematic. Moreover, case studies suggest that some surveys are informal—collected by

local teachers and administrators through telephone calls or word-of-mouth reports from friends and family—an approach that is unlikely to yield reliable estimates. A small percentage of districts contract with a professional vendor to collect follow-up data (White et al. forthcoming).

There are, of course, indicators and measures that are implemented with more reliability and accuracy in some states. Statewide academic assessments, for example, are reliable, although perhaps not always valid, as described earlier. In some states, postsecondary enrollment and completion rates are determined by analyzing college records in a systematic way. A number of states are using administrative data from the Unemployment Insurance (UI) system to determine how many students in vocational programs are employed—applying a common definition of employment across a data collection system that has incentives to be accurate. This approach, however, has been called into question by a recent ED interpretation of the Family Educational Rights and Privacy Act (FERPA), as described in Chapter 3. Still many states report that they would like to move toward the matching of administrative records, both to increase reliability and reduce the burden of reporting.

In 2001, performance measurement systems were still providing challenges but evolving.

Perkins III was passed in late 1998, but given the necessary planning and negotiations with ED, it was not until 2000 that states had established the initial measures they would use and the specific data that would be reported as baseline information for the 1999–2000 school year. It is therefore not surprising that in spring 2001, many states reported great difficulty in collecting necessary data and, based on their experiences, expected to be making changes in data collection over the next several years (Table 5.30).

- At the secondary level, few states found it difficult to collect data on high school completion, but close to half the states reported great difficulty gathering information on the attainment of vocational-technical skills and placement and retention in postsecondary education or employment.

- At the postsecondary level, no indicator appeared relatively easy to collect by most or all states. States indicated having the least amount of difficulty reporting data on postsecondary nontraditional programs and postsecondary credential completion, perhaps because community and technical colleges are already required to track college retention and completion under the Higher Education Act. The indicators with the greatest number of states reporting data collection problems were placement and retention in further education and training and the military.

Table 5.30
Number of States Indicating the Level of Difficulty in Collecting Perkins Performance Data: 2001

Indicator	Secondary Level		Postsecondary Level	
	Somewhat to Very Difficult to Collect	Expect to Change Procedures in Next Two Years	Somewhat to Very Difficult to Collect	Expect to Change Procedures in Next Two Years
Core Indicator #1				
Academic attainment	20	22	15	15
Vocational/technical skill attainment	26	18	18	13
Core Indicator #2				
Completion	5	9	10	8
Core Indicator #3				
Placement in (further) postsecondary education or advanced training	24	17	26	15
Retention in postsecondary education or advanced training	25	16	22	17
Completion of postsecondary education or advanced training	23	12		
Placement in employment	23	16	16	16
Retention in employment	30	18	23	21
Placement in military	26	20	29	17
Retention in military	33	15	34	16
Core Indicator #4				
Participation in nontraditional programs	15	13	10	11
Completion of nontraditional programs	20	14	9	11

SOURCE: White et al. forthcoming. Analysis of National Survey of State Directors of Vocational Education, 2001.

N=46 states

- Close to half the states reported that they expected to change some aspect of the performance measurement procedures at the secondary level, while a smaller number expected to make changes at the postsecondary level. States most often expected to change their ways of measuring or collecting information on retention in employment and, at the secondary level, the attainment of academic and vocational-technical skills.

Both the difficulty of data collection and the likelihood of state changes in measures have implications for the ongoing quality of the accountability system and for new legislation. Some of the challenges states and local programs face are likely to diminish as they become more familiar with data collection expectations and staff are trained in the new procedures; nonetheless, problems of validity and reliability will remain. Still a new law with completely different indicators or a different approach to accountability will likely interrupt the progress that has been made so far.

2. Early Performance Results

Responding to the new accountability provisions in Perkins III was a major activity for most state vocational officials and for many at the local level. States reported that improving data reporting and accountability was the second highest target of Perkins state leadership funds at both the secondary level (13.5 percent of all such funds nationally) and the postsecondary level (15.1 percent nationally) in 2001 (Tables 5.14 and 5.21). These figures may have reflected the focus in 2001 on reporting the first year of performance progress to ED under the new law.

Wide variation in state-reported performance results mostly reflects differences in measures and baseline data (starting points) because improvement goals were generally comparable across states and quite modest.

Performance variation across states is perhaps more a function of incomparable data than of gaps in performance progress. States used such different measures and standards and collected data of such uneven reliability that there is a huge range in baseline figures for the same indicators. Because of this variation, it is difficult to judge whether a state that appears to have high performance actually achieves better outcomes than a state that has seemingly low performance.

For example, one state reported that 6.9 percent of its secondary students met the state-defined performance level for academic achievement in 1999–2000, while another reported that 99.0 percent did so (Table 5.31). At the postsecondary level, states reported that a range of 5.0–97.8 percent of students met the state-defined performance level for postsecondary retention (Table 5.32). Most indicators had similar extremes, although two—secondary completion and secondary placement—had more narrow ranges.

Despite the great variation in baseline data, most states have negotiated modest targets for performance improvement with ED. Similar to the process of negotiating acceptable performance measures, states must also consult with ED on the level of improvement for each indicator in subsequent years. For each of the secondary and postsecondary indi-

Table 5.31
ED-Approved State Baseline Data in 1999–2000 and Improvement Targets for Secondary Performance Reporting in 2000–2001

Indicator	Range in Percentage of Students Meeting State-Defined Performance Level (Baseline Data: 1999–2000)		Range of Performance Targets for Following Year, 2000–2001 (Percentage Point Change)
	Low	High	
Secondary academic attainment	6.9	99.0	0–17.0
Secondary vocational-technical skill attainment	14.0	98.0	(-2.6)[1]–23.0
Secondary completion	26.0	99.5	(-7.9)[1]–1.0
Secondary placement in further education, employment, or military	33.1	98.5	0–1.5
Participation in secondary nontraditional programs	3.8	52.0	(-2.0)[1]–12.2
Completion of secondary nontraditional programs	4.2	96.0	0–1.3

SOURCE: White et al. forthcoming. Analysis of Perkins performance data, U.S. Department of Education, Office of Vocational and Adult Education, 2001.

[1]A very small number of states were granted negative targets, mainly those exhibiting relatively high baseline performance. Most targets are modest, averaging about one percentage point improvement over one year.

cators, states agreed to an average of a 1.0 percent increase per year under Perkins III,[40] although in some cases states were allowed to set negative targets.[41] For the most part, states were hesitant to "raise the bar" further because they lacked sufficient historical data to set reliable baselines and were unsure how the following year's data would turn out (White et al. forthcoming).

Despite the variation in performance, a majority of states met their targets.

Although states had various starting points and used different quality measures, most were able to achieve the goals they set for themselves. Whether this level of achievement reflects real improvement in performance, year-to-year fluctuations in data, or simply the

[40]Each state negotiated annual performance targets with ED. Data were based on an analysis of Perkins performance data, U.S. Department of Education, Office of Vocational and Adult Education, 2001 (White et al. forthcoming).

[41]Negative targets were allowed for states that submitted unusually high baseline performance.

Table 5.32
ED-Approved State Baseline Data in 1999–2000 and Improvement Targets for Postsecondary Performance Reporting in 2000–2001

Indicator	Range in Percentage of Students Meeting State-Defined Performance Level (Baseline Data: 1999–2000)		Range of Performance Targets for Following Year, 2000–2001 (Percentage Point Change)
	Low	High	
Postsecondary academic attainment	8.3	98.6	0–1.7
Postsecondary vocational-technical skill attainment	11.4	95.3	0–1.0
Postsecondary degree or credential	6.0	98.5	0–1.0
Postsecondary placement	43.4	98.0	(-2.6)[1]–1.0
Postsecondary retention	5.0	97.8	(-1.2)[1]–4.7
Participation in postsecondary nontraditional programs	5.2	38.4	0.1–1.2
Completion of postsecondary nontraditional programs	5.2	47.5	0–1.1

SOURCE: White et al. forthcoming. Analysis of Perkins performance data, U.S. Department of Education, Office of Vocational and Adult Education, 2001.

[1]A very small number of states were granted negative targets, mainly those exhibiting relatively high baseline performance. Most targets were modest, averaging about one percentage point improvement over one year.

low targets set is unclear. However, the newness and uncertainty of performance reporting under Perkins III makes these results unsurprising.

- At the secondary level, between one-half and three-quarters of states achieved their goals for particular indicators, including secondary completion (37), vocational-technical skill attainment (32), academic skill attainment (30), and placement in further education, employment, or the military (28) (Table 5.33).

- Three states—Louisiana, New Mexico, and Washington—did not meet any of their performance targets for these four indicators; while eight states met only one.

Most states submitted performance data for special populations.

Perkins III requires performance reporting for vocational students in general and for various subgroups or "special populations" as defined in the law (Section 3(23)): (1) individuals with disabilities; (2) individuals from economically disadvantaged families;

Table 5.33

States Meeting or Exceeding ED-Negotiated Performance Levels for Selected Secondary Indicators: 2000–2001

State	Academic Skill Attainment	Vocational/ Technical Skill Attainment	Secondary Completion	Secondary Placement
Alabama		✓		n/a
Alaska	✓		✓	
Arizona		✓	✓	✓
Arkansas		✓	✓	
California	✓	✓		
Colorado		✓		
Connecticut	✓	✓	✓	
Delaware	✓			
District of Columbia	✓	✓	✓	✓
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	✓		✓	✓
North Dakota		✓	✓	
Ohio		✓	✓	✓
Oklahoma	✓		✓	✓
Oregon	✓	✓	✓	
Pennsylvania	✓	✓	✓	✓

Table continued on following page

Table 5.33—continued

States Meeting or Exceeding ED-Negotiated Performance Levels for Selected Secondary Indicators: 2000–2001

State	Academic Skill Attainment	Vocational/ Technical Skill Attainment	Secondary Completion	Secondary Placement
Rhode Island	✓			
South Carolina	n/a	✓	✓	✓
South Dakota	✓	✓	✓	✓
Tennessee	✓		✓	✓
Texas	✓	✓	✓	✓
Utah	✓	✓	✓	
Vermont		✓	✓	✓
Virginia	✓	✓	✓	✓
Washington				
West Virginia	✓		✓	✓
Wisconsin			✓	
Wyoming	✓	✓	✓	
Guam	✓	✓	✓	✓
Puerto Rico	✓	✓	✓	
Total number of states meeting or exceeding performance target	30 states plus D.C. and two territories	32 states plus D.C. and two territories	37 states plus D.C. and two territories	28 states plus D.C. and one territory

SOURCE: White et al. forthcoming. Analysis of Perkins performance data, U.S. Department of Education, Office of Vocational and Adult Education, 2001.

n/a = state did not submit performance data for the specific indicator in 2000–2001.
A "✓" represents states that met or exceeded their performance target in 2000–2001.
A blank cell represents states that did not meet or exceed their performance target in 2000–2001.

(3) individuals preparing for nontraditional training and employment; (4) single parents, including single pregnant women; (5) displaced homemakers; and 6) individuals with other barriers to educational achievement, including limited English proficiency. Although states were required to submit to ED disaggregated data for each group, the actual results for these groups were not individually held to the negotiated performance targets. Thus, it is possible for a single group to improve substantially while other groups maintain or fall behind, and yet states could still achieve their targets and incentive payments.

Despite widespread concern about this level of reporting detail, most states did submit data for each indicator by special population categories. A few states did not: five states

did not report data on students with disabilities at the secondary level, while seven states did not do so at the postsecondary level.

Performance data were not available on Tech-Prep students in all states.

A number of states had difficulty providing all of the required performance data for Tech-Prep students, particularly on their enrollments in postsecondary education. As discussed in Chapter 4, many states and local programs had difficulty identifying which students are "in Tech-Prep" and therefore were unable to document how students perform in the program. Other states simply did not have the procedures or mechanisms to track students as they made the transition into postsecondary institutions. Because helping students make the transition into postsecondary education is a primary purpose of Tech-Prep, the inability of these states to provide the data indicates a much larger problem for the program.

3. Use of Data to Manage and Improve Vocational Programs

Perkins III clearly intended the accountability system to help states in "achieving statewide progress in vocational and technical education" (Section 113). The specification that states establish their own measures, levels of performance, and target goals suggests that Congress wanted states to have a substantial investment in the performance measurement system and to use the information to improve programs.

State and local administrators rarely viewed Perkins III data as useful for program improvement, but some do make use of the information.

Although surveys of state vocational officials suggest that some states have begun to use performance data to identify effective and ineffective programs and to target extra resources, case studies suggest otherwise (White et al. forthcoming; Stasz and Bodilly forthcoming). These same case studies indicate that few local practitioners are using the data for program improvement in their immediate communities or schools. Most state and local Perkins administrators viewed the legislation's new reporting requirements as primarily a reporting obligation to the federal government. A number of state and local vocational administrators attributed their limited use of Perkins data to concerns about the quality of the data collected, suggesting that the data would be used more when their quality improved.

There were some promising practices, however. Several states compiled Perkins data and provided local grantees with aggregate and comparative information. The aggregate data provided a statistical snapshot of the state's success in meeting its performance levels. The comparison data depicted how a grantee's performance stacked up against that of

the state as a whole. Local recipients indicated that such data would have been more helpful if their performance was compared to schools and districts serving similar students within the state.

Moreover, some states are using particular performance data for consequential decision-making, although in some cases the efforts to develop the data systems preceded, but are consistent with, Perkins III (Sheets forthcoming). Utah, for example, uses its skill certification system not only for Perkins reporting on vocational skill attainment but also to distribute state funds to vocational programs based on performance. Florida also uses outcomes data for performance-based funding decisions at the postsecondary level. Such states as Kentucky, Pennsylvania, and Oklahoma use their skill attainment data to provide students with state skill certificates or, in the case of Virginia, special endorsements on high school diplomas.

Very few states have actually identified individual districts or schools in their state as in need of improvement.

Perkins III lays out a strategy for state vocational program improvement based on the state-determined performance measures and their negotiated targets (Section 123). States are required to use the performance data to "evaluate annually" each eligible recipient of funds; if a grantee is not making "substantial progress in achieving the State adjusted levels of performance," the state is expected to (1) conduct an assessment of the grantee's needs, (2) work with the grantee to develop and implement an improvement plan, and (3) conduct additional evaluations of progress. The secretary of education may withhold some or all funds from the state under Section 123(d)(2) if grantees fail to make improvements. However, under Perkins III, a state cannot withhold funds from a local grantee for their failure to make performance improvements.

At least in 2001, few states had actually identified districts or schools in need of improvement (Table 5.34). In part, the Perkins accountability requirements were new, and more than half of the states simply did not have systems and procedures in place to diagnose local problems based on performance data. Some states, however, reported having appropriate systems but that no districts, schools, or postsecondary institutions were in need of improvement—i.e., that all of their grantees were performing at negotiated levels.

- Seven states reported identifying districts in need of improvement, and ten other states indicated having a system in place to determine local performance problems but had identified no districts in need of corrective action. Similarly, six states said that they identified schools in need of improvement; nine states had a system but identified no schools. Most states identified neither districts nor schools as in need of improvement.

Table 5.34
Number of States Indicating That They Identified Individual Schools and Districts as in Need of Improvement Based on Performance Data: 2001

	Secondary Level		Postsecondary Level
Response	Identifies Schools	Identifies Districts	Identifies Postsecondary Institutions
Yes, some have been identified	6	7	9
No, a system is in place, but none have been identified	9	10	16
No, we do not currently identify programs as such	28	25	20
Do not know	1	1	
Did not answer	2	3	1

SOURCE: White et al. forthcoming. Analysis of National Survey of State Directors of Vocational Education, 2001.

N=46 states

- While over half of states reported using performance data to identify postsecondary institutions in need of improvement in FY 2001, only nine actually did so.

4. State and Local Capacity to Develop and Maintain Vocational Accountability Systems

Lack of capacity at the state and local levels to collect required performance information is one of the biggest hurdles to overcome in developing effective accountability systems. According to case studies, the capacity of states to report this information was highest when Perkins indicators were measured by data that the state had already collected for other purposes, and lowest when the measure used required new, time-consuming data collection activities (White et al. forthcoming). Similarly, local reporting capacity was highest when districts or postsecondary institutions had already collected indicator data for different purposes and lowest for measures needing development.

Case studies also revealed that many states attempted to limit the data collection burden placed on eligible recipients. Data compilation mechanisms were typically electronic at the state level but often manual at the local level, particularly among secondary grantees. A number of states created Web-based or disk-based reporting forms that were sent to Perkins recipients, who compiled data from various sources and then entered them into the forms provided by the state. Some states were able to "pre-fill" data on some indicators (e.g., standardized test scores), but local recipients were typically asked to provide

student-specific information on vocational-technical skill attainment, placement, retention, and nontraditional participation and completion. In some cases, these efforts to streamline data collection included sharing information across agencies but most often they did not.

Limited coordination of definitions and measures between Perkins and related federal programs may be a barrier to developing effective accountability reporting.

During the 1990s, accountability became prominent in several pieces of federal legislation. The 1994 Amendments to the Elementary and Secondary Education Act (ESEA) introduced a requirement for states to define "adequate yearly progress" for districts and schools and to measure and report that information based on academic assessments linked to state standards. In 1998, both Perkins III and WIA were passed with strengthened requirements to report performance as well.

There is no specific language in the Perkins Act encouraging integration between Perkins accountability systems and those of other federal programs, but Congress expressed an intent that the federal education and training programs be better aligned. Perkins, for example, was designed to develop students' academic and technical skills "by building on the efforts of States and localities to develop challenging academic standards" (Section 2(1)), efforts that were required under the 1994 Amendments to the Elementary and Secondary Education Act (ESEA).[42] After debating whether Perkins and WIA should be combined into a single law, Congress passed separate acts with provisions to encourage coordination between activities funded under WIA Title I and Perkins III. Despite these intentions, however, efforts to coordinate accountability systems across multiple federal programs did not occur on a wide scale even around some of the more rudimentary data collection activities (White et al. forthcoming).

- ***Secondary-level coordination between Perkins and ESEA.*** Both federal programs include a requirement that states report on student academic skill attainment, although ESEA mandated that assessments must be linked to state standards and Perkins did not. Although ED encouraged states to adopt ESEA-approved statewide high school assessments for Perkins reporting, some states chose other measures they felt were better matched to their populations; in particular, because most vocational course taking occurs later in high school, many states wanted measures of academic attainment in the 12th grade rather than in the 10th grade, when high school academic assessments are typically administered. So, for example, some

[42]The No Child Left Behind Act was not signed into law until early 2002; because NAVE data collection was conducted in late 2001, states were still operating under the 1994 ESEA.

states are using ACT or SAT scores or assessments administered for community college placements for Perkins accountability measurement.

For these and other reasons, half the states indicated that there was little coordination between Perkins and ESEA on federal data reporting (Table 5.35). More than 30 states do not share data forms or development of performance benchmarks across programs. A majority of states do not use common data systems to retrieve comparable information. Moreover, case studies suggest that students in vocational programs are virtually never a subgroup for academic assessment reporting on school report cards, although those who invest in vocational education (take at least three credits) make up almost half of the high school population. States reported the greatest coordination in defining special populations, perhaps in part because of prior compliance with the Individuals with Disabilities Education Act.

- ***Postsecondary-level coordination between Perkins and WIA.*** Although there appears to be some commonality in how participants and special populations are defined across Perkins and WIA, many other aspects of the two accountability systems are not well-coordinated (Table 5.35). First, the two laws mandate somewhat different outcome indicators: WIA requires employment and earnings outcomes, while Perkins requires educational, vocational skill attainment, and employment outcomes. Even where the indicators overlap—with employment—the measures states have required local programs to use to report Perkins and WIA performance are often different. For example, Section 136 of WIA specifies a six-month follow-up period to verify employment retention; however, Perkins allows states to determine the follow-up period, and many have chosen periods other than six months.[43]

  It is perhaps for these reasons that about half of the states or more report that Perkins and WIA accountability systems do not share reporting forms (34), data systems (23), or the setting of performance benchmarks (27). This lack of coordination results in an increased data collection burden for postsecondary Perkins grantees that also participate as WIA providers (Hudis, Blakely, and Bugarin forthcoming; White et al. forthcoming).

[43]For example, for reporting Perkins employment, Massachusetts requires information nine months after leaving education, while Michigan requires information after only three months—neither of which coincides with the WIA six-month definition (Hudis, Blakely, and Bugarin forthcoming).

Table 5.35
Number of States Reporting "None" or "Not Very Much" Coordination between Perkins and Related Federal Legislation on Specific Accountability System Elements: 2001

Position	Perkins (Secondary) and ESEA[1]	Perkins (Postsecondary) and WIA[2]
Common definitions for participation	25	16
Common definitions for special populations	9	10
Common reporting forms	33	34
Common data systems	23	23
Jointly determined performance benchmarks	34	27

SOURCE: White et al. forthcoming. Analysis of National Survey of State Directors of Vocational Education, 2001.

[1]Elementary and Secondary Education Act. The NAVE state directors' survey was administered in 2001 under ESEA prior to the passage of the No Child Left Behind Act of 2001.
[2]Workforce Investment Act of 1998.

N=45 states for Perkins (secondary); N=44 states for Perkins (postsecondary)

More than half of all states have not implemented and do not plan to implement several data collection mechanisms that could aid them in their Perkins reporting.

More than half of the secondary state directors indicated that they had neither implemented nor did they have a current plan to implement the following types of data systems or capabilities:

- Computerized secondary school transcripts (both academic and vocational).
- Computerized secondary school records with no or limited course data but including flags for vocational participation.
- Stand-alone computer systems for secondary vocational students.
- Ability to link high school records (vocational or all students) to computerized records for students in state postsecondary vocational institutions.
- Ability to link high school transcripts (vocational or all students) to computerized records for students in the states' four-year colleges and universities.
- Ability to link high school records (vocational or all students) to military records.

Only 11 states reported that they had a fully implemented system to link high school records to unemployment insurance (UI) data, and another 17 states indicated that they had partially developed this capacity or planned to do so in the next two years (White et al. forthcoming).

States had better data collection capacity at the postsecondary level than at the secondary level, but systems are still being developed. Only about a quarter of states (19) reported in 2001 having a fully implemented computer system that includes both vocational and other students. Fifteen states had either a partially implemented system or planned to implement such a system in the next two years, while 11 states had neither implemented nor planned to use this particular type of resource for performance reporting (White et al. forthcoming).

States vary considerably in what they report spending on their accountability systems, with no clear relationship between the population size of a state and reported costs.

Most states reported collecting at least some of the Perkins III data before the passage of the law, but most also reported needing to make substantial adjustments or additions to meet the new requirements (White et al. forthcoming). These changes resulted in new investments in data systems, training of staff, or sometimes reassignment of staff to accountability functions. As noted earlier, state officials reported spending 13.5 percent of Perkins state leadership funds at the secondary level and 15.1 percent of those funds at the postsecondary level on improving data collection and accountability.

Data collected from 10 states during the case studies and telephone interviews indicate that the amount spent on developing and maintaining accountability systems varied widely in 2001. For example, two states spent less than $25,000, while one state invested $743,800 (Table 5.36). Small states reported feeling most burdened by the Perkins requirements: they receive proportionately small federal Perkins grants but are expected to collect the same number of indicators as larger states with bigger grants and, presumably, larger state education budgets. Still, examining the recent expenditures on performance measurement systems across states suggests they are more likely to reflect prior investments in developing the systems (i.e., the sophistication and scope of existing data collection) than the size of the state.

Table 5.36

State-Reported Costs of Establishing and Maintaining Accountability Systems at the State Level: FY 2001

State (Size[1])	Annual Cost
State 1 (medium size)	$535,250
State 2 (medium size)	$22,500
State 3 (medium size)	$215,000
State 4 (medium size)	$743,800
State 5 (small size)	$135,000
State 6 (small size)	$240,000
State 7 (small size)	$158,000
State 8 (small size)	$544,000
State 9 (small size)	$107,000
State 10 (small size)	$9,000

SOURCE: White et al. forthcoming. Analysis of Funding and Accountability Case Studies and Phone Interviews.

[1]State size was determined by public student enrollment in grades 9–12. States and the District of Columbia were identified as small, medium, or large in equal numbers.

6. Conclusions and Potential Future Directions for the Perkins Act

The Carl D. Perkins Vocational and Technical Education Act of 1998 (Perkins III) is the most recent stage in an 85-year history of federal support for career preparation in American schools. The law introduced new funding and accountability provisions, but otherwise did not alter the basic structure of the previous legislation (Perkins II). Whether more significant changes are needed as part of the upcoming reauthorization depends largely on policymakers' sense of what vocational education has achieved, or could achieve in the future, and their priorities for an ongoing federal role.

This chapter synthesizes the current research and its implications for policy, the two issues NAVE is expected to address:

1. What conclusions can be drawn about the role and effects of secondary and postsecondary vocational education and the implementation of Perkins III? (Section A)

2. What options might policymakers consider for future federal vocational legislation? (Section B)

A. Conclusions

The National Assessment of Vocational Education (NAVE) was charged with evaluating the status of vocational education in the United States and the impact Perkins III has had on it. After more than three years of study NAVE finds that, for many students, vocational education has important earnings benefits at both the secondary and postsecondary levels, and these benefits extend to economically disadvantaged students and several other populations of special policy interest. In addition, over the last decade of academic reforms secondary students who participate in vocational programs have increased their academic course taking and achievement, making them better prepared for both college and careers than were their peers in the past. In fact, students who take both a strong academic curriculum and a vocational program of study—still a small fraction of high school graduates—have somewhat better outcomes than those who pursue either one or the other.

However, while positive change is certainly happening in high schools, which have been the focus of most policy concern, secondary vocational education itself is not likely to be a widely effective strategy for improving academic achievement or college attendance without substantial modifications to policy, curriculum, and teacher training. The current legislative approach of encouraging "integration" as a way to move secondary vocational education toward supporting academics has been slow to produce significant reforms.

In large part, the pace and path of improvement are hampered by a lack of clarity over the program's fundamental purpose and goal. Perkins III offers a conflicted picture of federal priorities for vocational education improvement—academic achievement, technical skills, high school completion, postsecondary enrollment and degree completion, and employment and earnings. Without a clearer focus for the federal investment—amounting to about 5 percent of local spending—around which to rally the commitment and efforts of vocational teachers, counselors, and administrators, ongoing program progress in any particular direction is less certain.

This overall assessment draws on evidence addressing three key NAVE questions:

1. How does, or can, vocational education improve the outcomes of secondary students who choose to enroll in vocational and technical programs?
2. What is the nature and impact of vocational education at the sub-baccalaureate level, and what is its relationship to current workforce development efforts?
3. Is the policy shift from set-asides and legislative prescription to flexibility and accountability likely to improve program quality and student outcomes? How do special populations fare?

1. How does, or can, vocational education improve the outcomes of secondary students who choose to enroll in vocational and technical programs?

Perkins III and its legislative predecessors have largely focused on improving the prospects for students who take vocational education in high school, a group that has historically been considered low achieving and noncollege-bound.[1] However, students who participate most intensively in vocational programs are actually quite diverse; certainly, about a quarter never enroll in postsecondary education, but a substantial number (18 percent) go on to complete at least a baccalaureate degree. The vocational courses most high school students take improve their later earnings, but have no effect on other outcomes that have become central to the mission of secondary education—such as improving academic achievement or college transitions (Table 6.1). Whether the program as currently supported by federal legislation is judged successful depends on which outcomes are most important to policymakers.

Table 6.1
Value-Added Effects of Vocational Education on Student Outcomes: Summary of Recent Research Evidence

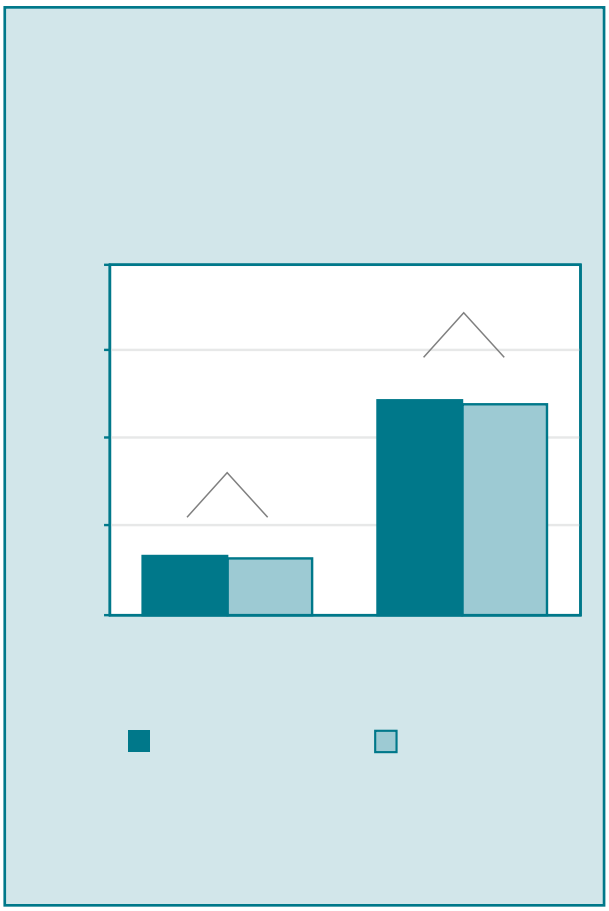
Outcome	Effect	Research Evidence
Academic achievement	0	Consistent
High school completion	0/+	Mixed
Postsecondary enrollment		
Short-run (about one year after high school graduation)	–/0	Mixed
Medium-run (seven years after high graduation)	0	One study
Postsecondary completion (seven years after high school graduation)	0	One study
Complete a four-year college degree (vs. associate degree or certificate)	–	One study
Short- and medium-run earnings	+	Consistent

SOURCE: Agodini forthcoming; Agodini and Deke forthcoming; Agodini, Deke, et al. forthcoming; Crain et al. 1999; Hoachlander et al. forthcoming; Kemple and Scott-Clayton 2004; Plank 2001.

+ = vocational education increases the outcome.
– = vocational education reduces the outcome.
0 = vocational education has no effect on outcome.

[1]About 62 percent of Perkins funds are spent at the high school level.

- ***The short- and medium-term benefits of vocational education are most clear when it comes to its longstanding measure of success—earnings.*** Several recent studies highlight the positive average effects of vocational course taking on annual earnings, measured just over a year or several years after high school graduation. Seven years after graduation, for example, students earned almost 2 percent more for each extra high school vocational course they took. That translates into about $450 per course, based on average earnings of about $24,000 (Figure 6.1); the benefit would be $1,350 more for the 45 percent of all high school graduates who take at least three occupational courses, including the quarter of graduates who concentrate their course taking in one program area (occupational concentrators).



To varying extents, the studies indicate that these benefits extend to the large group of high school graduates who enroll in postsecondary education or training, to both economically and educationally disadvantaged students, to those with disabilities, and to both men and women. In addition, students who complete the "New Basics" academic curriculum *as well as* occupational courses—about 11 percent of all graduates—earn more than similar students who complete the New Basics and little vocational education.[2] However, the studies are more mixed on whether secondary vocational courses benefit the one-quarter of high school graduates who never enroll in postsecondary education, a group that has historically been the focus of vocational policy.

[2]The "New Basics" academic curriculum, as measured here, is equivalent to four years of English or language arts, and three years each of math, science, and social studies. Many states are moving to this standard for core high school graduation requirements.

There are also some important caveats to these earnings results. First, the evidence that vocational courses increase wages, which might be considered a proxy for a "better" job, is somewhat weak; on average, for the national groups of students examined, the higher earnings appear to be the result of the greater number of hours worked by students who had enrolled in secondary vocational education. On the other hand, taking occupational courses in high school may be associated with higher wages for young men and for students who are economically or educationally disadvantaged. Second, the period over which earnings can be calculated with available data (at most seven years) do not provide much opportunity for those who stay in postsecondary education longer and attain higher level credentials to reap the benefits in the labor market. Finally, in percentage terms, the estimated effects on earnings about one year after graduation (about 3 percent) and seven years after graduation (about 2 percent) suggest a decline over time.

- ***Students in vocational programs of study have significantly increased academic course taking and achievement over the last decade, although gaps remain.*** During the 1990s, successive groups of occupational concentrators took more, and more rigorous, academic courses along side their vocational curriculum (Table 6.2). By the end of the decade, the academic credit gap between them and

Table 6.2

Percentage of Occupational Concentrators and Non-concentrators Completing the "New Basics" Core Academic Curriculum and a College Prep Curriculum: 1990 and 2000

Academic Indicator	1990	2000	Percentage Change
"New Basics" academic curriculum[1]			
Occupational concentrators	18.5	51.1	+32.6*
Non-concentrators	45.7	60.3	+14.7*
Gap between concentrators and non-concentrators	-27.1	-9.2	-17.9*
College prep curriculum[2]			
Occupational concentrators	10.1	29.2	+19.1*
Non-concentrators	35.9	46.2	+10.3*
Gap between concentrators and non-concentrators	-25.8	-17.0	-8.8*

SOURCE: Levesque 2003b. Analysis of National High School Transcripts.

[1] New Basics = Four years of English and three years of math, science, and social studies.

[2] The "college-prep curriculum" 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 (see Levesque et al. 2000).

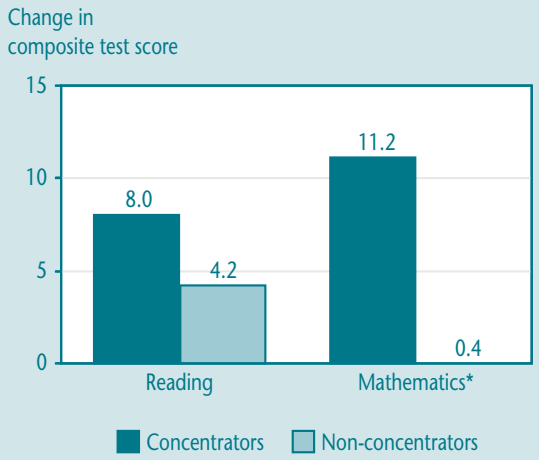
*Statistically significant at the 0.05 level.

students who took little or no vocational education had narrowed substantially. However, there were still differences between concentrators (51.1 percent) and non-concentrators (60.3 percent) in the proportion who completed the extensive New Basics core academic curriculum and larger gaps in the percentage that completed a rigorous college preparatory curriculum (29.2 percent versus 46.2 percent).

More importantly, occupational concentrators also made substantial progress on academic achievement (Figure 6.2). The NAEP 12th-grade test scores of occupational concentrators increased during the decade, by about eight scale points in reading and 11 scale points in math. Students who took little or no vocational education increased their reading achievement by about four points in reading and experienced no increase in math achievement. As a result of these trends, the gap between concentrators and non-concentrators remained roughly stable in reading, while the gap in math achievement was reduced significantly.

Figure 6.2

Change in NAEP 12th-Grade Test Scores for Concentrators and Non-concentrators: Reading 1994–1998 and Mathematics 1990–2000



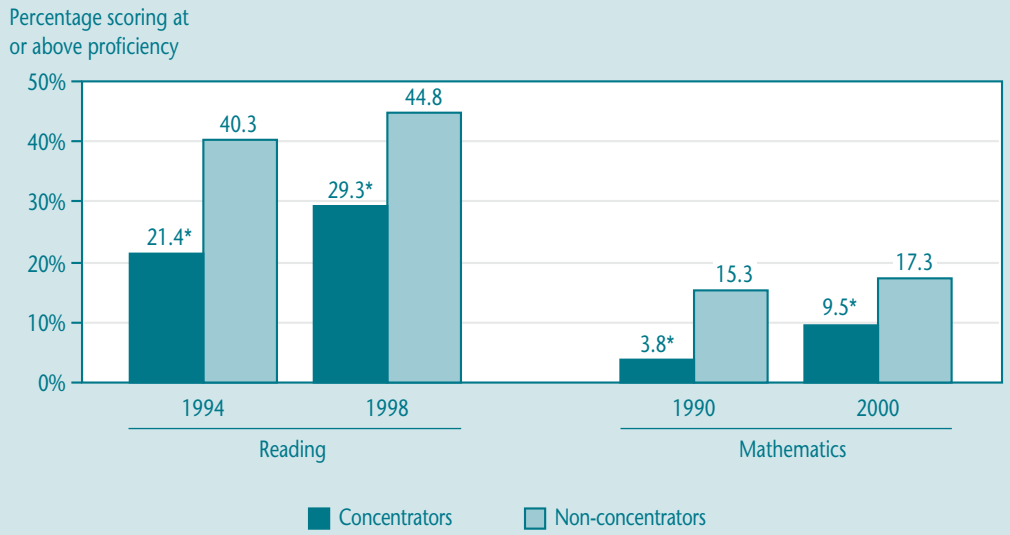
SOURCE: Levesque and Paret forthcoming. Analysis of 12th-Grade NAEP Assessments.

*Difference between concentrators and non-concentrators is statistically significant at the 0.05 level.
NOTE: All increases over time are statistically significant at the 0.05 level except for non-concentrators in mathematics.

The NAEP assessments indicate that there has been substantial progress, but more work is necessary to raise the achievement levels of all students, particularly those in vocational programs. Most importantly, occupational concentrators are far less likely than non-concentrators to be proficient in reading or math, as defined by their most recent NAEP test scores (Figure 6.3). If proficiency on the 12th-grade NAEP assessments is associated with readiness for postsecondary education or success in the labor market, then these figures suggest a greater focus on academic improvement is needed.

Figure 6.3

Percentage of Concentrators and Non-concentrators Scoring at or above Proficiency on NAEP 12th-Grade Test Scores: Reading 1994–1998 and Mathematics 1990–2000



SOURCE: Levesque and Paret forthcoming. Analysis of 12th-Grade NAEP Assessments.

*Difference between concentrators and non-concentrators is statistically significant at the 0.05 level.
NOTE: All increases over time are statistically significant at the 0.05 level except for non-concentrators in mathematics (1990–2000).

- ***There is little evidence that vocational courses contribute to improving academic outcomes.*** The noted improvements in performance are likely due to higher academic graduation requirements and increased emphasis on academic reforms. Both analyses of high school student data and randomized controlled studies indicate that, on average, vocational courses and programs do not themselves "add value" to academic achievement as measured by test scores. Not surprisingly, substituting additional academic courses for occupational courses does raise achievement. Moreover, although there is mixed evidence that vocational education reduces dropping out of school, the more rigorous studies suggest there is no effect. In an era of heightened interest in academic improvement, courses lacking a clear academic focus are being questioned and case studies suggest that vocational enrollments may decline in the future.

- ***Postsecondary transition rates have increased; vocational courses neither hurt nor help most students' chances of going on to college but are associated with a shift from earning a bachelor's degree to earning an associate's degree or certificate.*** Vocational education has long been stigmatized as for the "noncollege bound" or as a deterrent to college, although NAVE finds that neither of these

concerns is well founded. The best available national trend data indicate that higher proportions of occupational concentrators are moving on to some form of postsecondary education or training, although they still participate overall at lower rates than do other students and in particular in four-year colleges and universities (Table 6.3). Many concentrators enroll later, so that by seven years after graduation nearly three-quarters versus 90 percent of all other students have participated to some extent.

Table 6.3
Percentage of 1982 and 1992 High School Graduates Who Enrolled in Postsecondary Education or Training within Two Years after Graduation: 1984 and 1994

Curriculum Path	1982 Graduates	1992 Graduates	Percentage Change	1992 Graduates in Four-Year Institutions
All students	57.3	73.0	+27.4	41.4
Occupational concentrators	41.5	54.7	+31.8	21.3
College preparatory	95.6	93.2	-2.5	73.3
Other/General	61.2	69.1	+12.9	30.4

SOURCE: Levesque et al. 2000. Analysis of High School and Beyond Longitudinal Study (HS&B) and National Education Longitudinal Study (NELS).

However, improvements in postsecondary enrollment do not appear related to vocational course taking. Studies of graduates in both the early and later 1990s indicate that vocational education itself has no effect on whether students ever attend postsecondary education or training.[3] Moreover, among those who enroll, high school vocational education is associated with a lower likelihood of completing a bachelor's degree program and a corresponding higher likelihood of completing an associate's degree or certificate program.

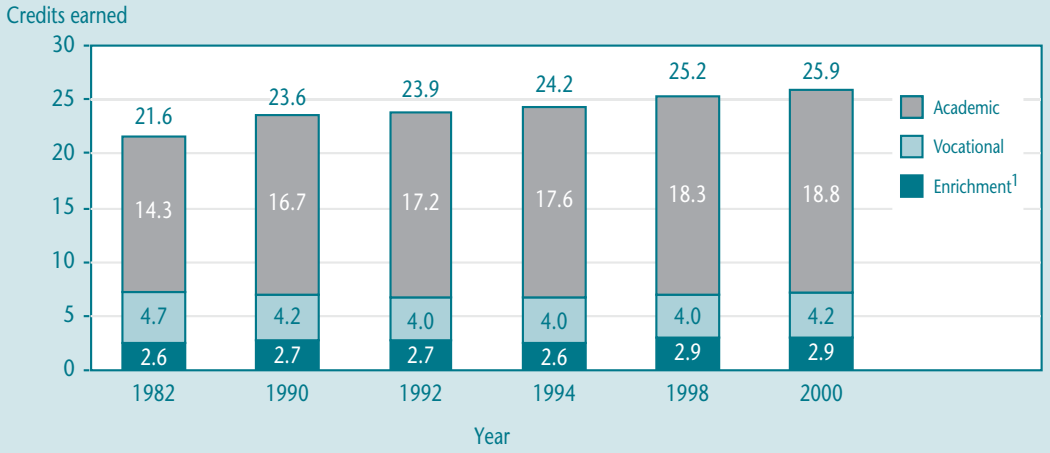
► ***Secondary vocational education is a large component of high school course taking and serves a diverse set of students, but it is an increasingly smaller share of the overall curriculum.*** Nearly every student (96.6 percent) leaves high school having taken some vocational education, although the extent of student involvement var-

[3]Some students enroll in high school vocational education because they do not plan to attend college, so a negative relationship between vocational courses and postsecondary education might be expected. However, even controlling for college plans and other student characteristics, vocational courses have no effect, on average, on postsecondary enrollment.

ies. By almost any measure, participation remained stable during the last decade after an earlier period of decline, withstanding schools' ongoing focus on academic improvement. While there was little change in the amount of vocational course work taken by high school students during the 1990s, students earned more academic credits thus lowering vocational education's share of the overall high school curriculum—from 21.8 percent in 1982 to 17.8 percent in 1990 to 16.2 percent in 2000 (Figure 6.4). Still, high school students earn, on average, more credits in vocational education (4.0) than in math (3.4) or science (3.1).

Figure 6.4

Average Credits Earned by High Schools Students, by Type of Course Work: 1982–2000



SOURCE: Levesque 2003b, 2003c. Analysis of National High School Transcripts.

[1]Includes courses such as art, music, and driver's education.

Those who participate most intensively—occupational concentrators—are a varied set of students. However, those who have disabilities or are male, come from lower-income or rural schools, or arrive at high school with low academic achievement participate more substantially than do other students. These patterns were generally stable during the last decade, although vocational education appeared to attract relatively more academically talented students during the 1990s. Less progress was made on overcoming gender differences in vocational course participation.

► ***Diversity in program objectives makes it more difficult to find "average" effects.*** Local vocational programs are designed to achieve different outcomes and therefore implemented in widely different ways and targeted to different groups of students. This diversity makes determining the national effects of vocational education on any particular outcome somewhat like aggregating apples and oranges.

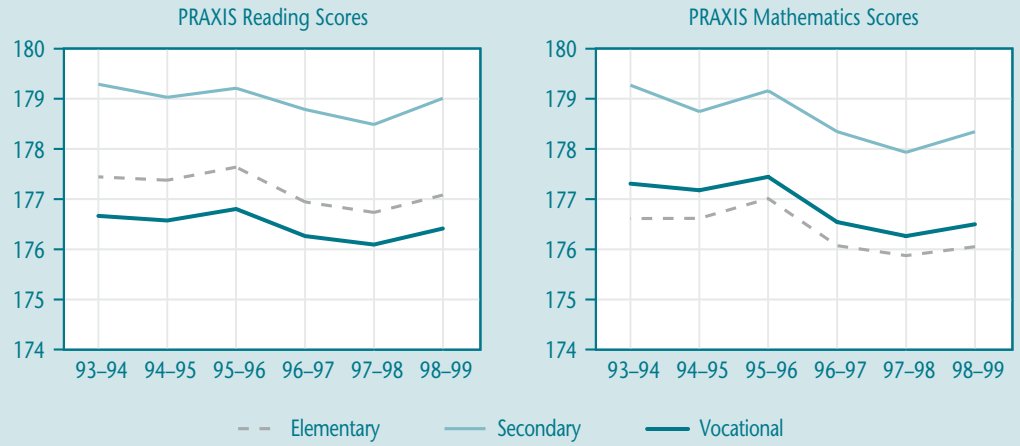
Average estimates are an appropriate measure of vocational education's overall performance. Undoubtedly though, in some communities vocational courses are organized to enhance students' academic achievement and do have such an impact; in many other places the focus is on improving occupational or technical skills and those programs would want to be judged on that basis. Perkins III accountability provisions currently hold vocational education responsible for—with equal weight—all of the desirable high school outcomes.

- ***The Perkins quality improvement strategies may be too vague to drive change without clear direction.*** Perkins III carried over a variety of strategies from Perkins II—such as integration of academic and vocational instruction, learning all aspects of an industry, linking secondary and postsecondary programs, collaborating with employers, and expanding the use of technology. Several of these strategies, including integration, are ill defined and that may be a barrier to wider implementation. In addition, little is known about their effectiveness in improving student outcomes. Perhaps more importantly, the practices are potentially targeted toward different outcomes: for example, technology might be expected to affect occupational-technical skills, integration to affect student's academic achievement. The list does not reflect a focused purpose to the federal investment.

- ***Standards-based reform in vocational education may have the potential to improve outcomes, once the priorities are established.*** Although occupational standards have been in existence in some form and fields for decades, they have only recently been given systematic attention at the state level. A small handful of states have so far developed standards for most or all of their secondary vocational programs, made them mandatory, developed or purchased assessments to evaluate student and program performance, and begun to attach consequences to performance—an approach similar to that encouraged under the No Child Left Behind Act for elementary and secondary academic education. Perkins III only hints that occupational standards are desirable and implementation of the federal accountability requirements currently allows states and local programs to use any measure—including high school grade point average or course completion—as an indicator of occupational skill. Applying a standards-based reform approach to vocational education would require policymakers to more clearly specify vocational education's primary objective and to invest resources in assessing progress toward it.

- ***Improving teacher quality will be important if vocational education is expected to alter its mission.*** Teachers have the most direct impact on instruction and the earnings benefits for many vocational students suggest that vocational teachers may be effective in promoting that outcome. However, federal legislation over the past decade has tried to guide vocational education toward providing greater support for academic achievement; student outcomes and program implementation suggest that these efforts have been less successful. Current vocational teachers are less likely than academic teachers to have a bachelor's degree and many do not feel they have received sufficient professional development on the key strategy of integration. Moreover, prospective high school vocational teachers (in vocational teacher training programs) score lower on basic reading and writing tests than do those preparing to be elementary school teachers and lower than other secondary teachers in math (Figure 6.5). Substantial investments in new recruitment and in-service training approaches may be required if federal legislation continues to make supporting academic achievement a priority for vocational education.

Figure 6.5
PRAXIS (Preservice) Reading and Mathematics Scores, by Type of Prospective Teacher: 1994–1999



SOURCE: Cramer forthcoming. Analysis of PRAXIS Test Scores.
NOTE: These results are for the paper-based version of the test.

- ***Tech-Prep was a catalyst for certain vocational reform activities but, because few schools implement it as a comprehensive program of study, it is now playing less of a distinctive role.*** Efforts to promote both integration of academic and vocational instruction and articulation between secondary and postsecondary education were stimulated by the Tech-Prep Education Act in Perkins II. However, 12 years later, few schools implement Tech-Prep as a structured program with at least two years of clearly linked high school course work and at least two years of related postsecondary course work (the "two-plus-two" design). The most recent estimates suggest that about 10 percent of Tech-Prep consortia, representing 5 percent of Tech-Prep students overall, may be promoting this comprehensive two-plus-two approach. In 2001, only seven states reported that they require local programs to implement Tech-Prep as a distinct program.

  More typically schools implement individual components of the Tech-Prep model—maintaining articulation agreements, providing professional development on integration to academic or vocational teachers, or improving career guidance and planning. Many of these activities are becoming part of secondary vocational education more broadly, and little change has occurred at the postsecondary level to accommodate Tech-Prep students. As a result, Tech-Prep efforts now overlap substantially with those of regular vocational education.

2. What is the nature and impact of vocational education at the sub-baccalaureate level, and what is its relationship to current workforce development efforts?

Given the labor market value of college credentials, "life long learning," and flexibility in skills, the role of sub-baccalaureate vocational education is increasingly important. Many different types of students, with different intentions, cross the doors of community colleges and other Perkins-eligible postsecondary institutions; even with this diversity, the institutions provide services from which most participating students benefit. Relatively low rates of retention are a concern, however, not only because federal policy has long encouraged postsecondary degree completion as a strategy for maintaining American economic competitiveness but also because individual participants would reap much greater earnings advantage from staying long enough to earn a credential. An emphasis on degree completion may be at odds with the shorter-term training emphasized by the Workforce Investment Act (WIA). But at least so far, integration of decision-making and services between Perkins and WIA has been limited in most states.

- ***There are significant economic returns to postsecondary vocational education, with the greatest benefits for those who earn a credential.*** As was true at the secondary level, vocational education in community colleges appears to produce a substantial positive effect on earnings for the vast majority of participants. There are differences in these returns, depending on how much course work is completed (Table 6.4). Some postsecondary vocational participants do benefit from a year's worth of vocational course taking even without attaining a credential, earning between 5 and 8 percent more than do high school graduates with similar characteristics. However, much higher economic rewards go to those who pursue significant amounts of postsecondary vocational education and earn a degree or certificate; female associate's degree holders, for example, earn 47 percent more than similar students with a high school degree and males earn 30 percent more. These results represent the average effects of earning postsecondary degrees. Although many economists argue that the effects vary widely by occupational field, the available data did not permit fields of study to be analyzed separately.

Table 6.4
Adjusted Percentage Difference in Earnings between Postsecondary Vocational Program Participants and High School Graduates, by Gender: 2000

	Percentage Difference in Earnings[1]	
Returns to:	**Male**	**Female**
One year of postsecondary vocational courses	8.0*	5.4
Credential		
Institutional certificate	6.5	16.3*
Vocational associate degree	30.2*	47.0*

SOURCE: Bailey, Kienzl, and Marcotte forthcoming. Analysis of the National Education Longitudinal Study (NELS).

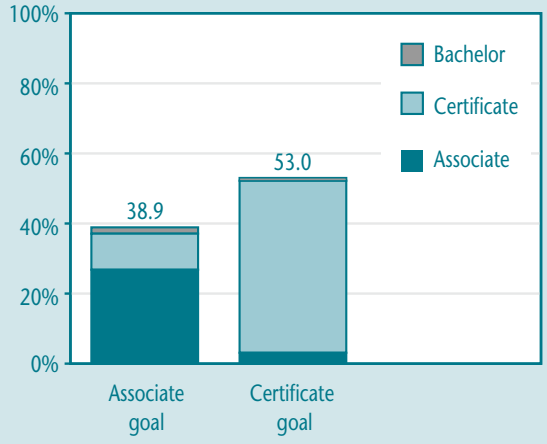
[1]Numbers are the actual earnings returns in percentages, calculated by taking the anti-log of the regression coefficients; tests of statistical significance were computed using the original regression coefficients.

*Statistically significant at the 0.05 level.

- ***Fewer than half of postsecondary vocational participants seeking a degree or certificate take enough courses to earn a credential.*** Like their academic counterparts, many vocational participants leave sub-baccalaureate institutions and programs having completed few courses; more than two-thirds of vocational majors

complete the equivalent of a year or less of course work within a five-year time period. Even among those who enroll with the goal of earning a degree or certificate, fewer than half actually complete a credential of any kind (Figure 6.6).[4] Taking student goals and characteristics into account, the completion rate for vocational majors is similar to that of academic majors, although vocational participants are more likely to earn a shorter-term credential (e.g., certificate) than they originally set out to attain. The relatively low completion rate among postsecondary vocational students is consistent across categories of students, including those in special population groups.

Figure 6.6
Highest Credential Attained by Postsecondary Vocational Participants within Five Years, by Stated Goal:1994

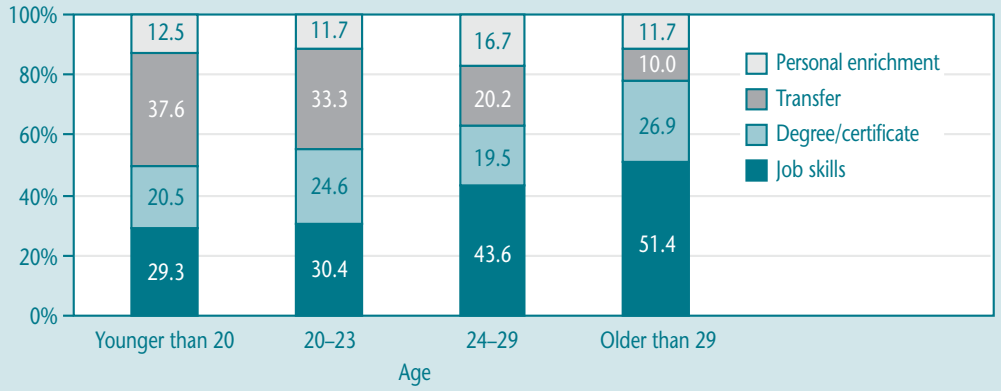


SOURCE: Bailey, Alfonso, et al. forthcoming. Analysis of the Beginning Postsecondary Students Longitudinal Study, 1989–94.

- ***Postsecondary vocational education serves a large and diverse population with varied expectations.*** About one-third of all students in undergraduate postsecondary education are considered to be in postsecondary vocational programs. These sub-baccalaureate vocational students vary in age, income, work experience, and previous college activity. Not surprisingly, then, they enroll with different goals—to get an associate's degree or institutional certificate, to transfer and pursue a bachelor's degree, to enhance their job skills, or to engage in personal enrichment activities; older students are more interested in obtaining job skills while younger students are more likely to aim for a credential (Figure 6.7). To accommodate this diversity, community colleges have to be particularly flexible institutions. Perkins III funds, which represent just 2 percent of vocational education expenditures in public two-year colleges, can be used to support any part of the enterprise.

[4]The comparable rate for all students entering four-year postsecondary programs seeking bachelor's degrees is 61.9 percent; that is, almost two-thirds of students who enter these longer degree programs actually earn a credential of some kind (including those less than a baccalaureate), compared to about half of students who enter shorter-term vocational associate degree programs.

Figure 6.7
Percentage Distribution of Postsecondary Vocational Students, by Age and Reported Primary Goal: 1996



SOURCE: Silverberg et al. 2002. Analysis of the National Postsecondary Student Aid Study, 1996.
NOTE: Percentages may not add to 100.0 due to rounding.

- ***Community colleges have had limited involvement in early implementation of WIA, citing both low emphasis on training and reporting requirements as disincentives.*** Early WIA implementation, during a period of economic expansion and job growth, primarily emphasized the development of new procedures and the delivery of employment information over the kinds of training activities Perkins-eligible institutions typically provide. There is some evidence that, with the recent economic downturn, training vouchers and policy interest in training are increasing, but the lack of coordination between WIA and Perkins accountability measures reportedly still lead to substantial burden for participating institutions.

3. *Is the policy shift from set-asides and legislative prescription to flexibility and accountability likely to improve program quality and student outcomes? How do special populations fare?*

The funding and accountability changes enacted under Perkins III have been partially successful in addressing policymakers' objectives, although much is still in development. Local grantees are receiving larger dollar amounts and case studies suggest they are able to distribute secondary Perkins funds to more schools, outcomes consistent with the goal of directing more money to the local rather than state levels. However, both the traditional ways in which grantees use their funds and early implementation of the higher stakes accountability system forecast at best slow change in vocational program quality. Despite serious commitment among state administrators, technical measurement and data quality problems hinder widespread use of performance data for program management at either the state or local levels. Given these deficiencies, it seems unlikely that, in the

short run, the accountability system will have particular benefits for special population students, especially since identifying and collecting data on these students has proven to be particularly difficult for state and local officials. The effects of eliminating targeted set-asides intended to promote gender equity is currently unknown.

- ***The new law succeeded in sending a higher share of funds to the local level.*** The average size of local grants grew substantially between Perkins II and Perkins III (approximately 34 percent for secondary and 26 percent for postsecondary grantees) (Table 6.5). These increases cannot be fully explained by increases in federal appropriations that go to state grants (just over 15 percent) or a reduction in the number of grants awarded.

Table 6.5
Grant Amounts Awarded to Secondary and Postsecondary Recipients: 1992 and 2001

Grant Amounts	1992	2001	Difference	Percentage Change
Perkins appropriations for state and substate grants (in thousands)[1]	$954,259	$1,100,000	$145,741	15.3
Average secondary substate grant amount				
Current dollars	76,238	101,813	25,575	33.5
Real dollars (2001)	96,670	101,813	5,143	5.3
Average postsecondary substate grant amount				
Current dollars	226,019	285,645	59,626	26.4
Real dollars (2001)	286,592	285,645	-947	-0.3

SOURCE: White et al. forthcoming. Analysis of National Survey of State Directors of Vocational Education, Fiscal Data 1992 and 2001.

[1]Overall Perkins appropriations included other programs that on average increased 7.3 percent between 1992 and 2001.

- ***Flexibility provisions are popular but may be weakening the targeting of funds to high-poverty communities.*** Nearly 30 states at the secondary level and 20 at the postsecondary level use at least one of the flexibility provisions in Perkins III. The most common choice is the newly established "reserve fund" provision, which allows states to award 10 percent of local funds to programs in rural and other areas without using the poverty-weighted legislated formula. Perhaps as a

result, the dollar advantage of high-poverty districts has declined since Perkins II (Table 6.6).

Table 6.6
Average Perkins Grant Amounts, Adjusted for Student Enrollments, by LEA Poverty Level: 1992 and 2001[1]

Poverty Level[3]	Grant Amount per Secondary Student[2] 1992	2001	Percentage Change
High-poverty school districts	$51	$53	3.9
Medium-poverty school districts	28	32	14.3
Low-poverty school districts	32	41	28.1
All school districts	32	40	25.0

SOURCE: White et al. forthcoming. Analysis of National Survey of State Directors of Vocational Education, Fiscal Data 1992 and 2001, and NCES, Common Core of Data (CCD).

[1]Averages based on 29 states for which data were available in both 1992 and 2001 and where more than 80 percent of grantee recipients in a state had an NCES ID.

[2]These calculations adjust for the number of 9th- through 12th-grade students in a district to isolate the effects of targeting from those of enrollments.

[3]Poverty level is measured by the number of students in a district qualifying for the federal free or reduced-price lunch program: Low poverty = 0 to 9 percent of students in a district qualify; medium poverty = 10 to 49 percent of students; and high poverty = 50 percent or more of students.

Perkins III also included several options to allow states to better coordinate federal vocational funds and activities with those of other federal programs. Only one state submitted to ED a "consolidated" plan to integrate vocational education with other education programs, and 12 states submitted "unified" plans in which they described their expected activities under some combination of the Perkins, WIA, Adult Education, and Vocational Rehabilitation laws. Although, under the ED-Flex program, states received authority to waive Perkins requirements, states generally did not exercise that authority.

- ***Implementation is progressing, but so far, the performance measurement system is rarely viewed as a tool for program improvement.*** The current system, perhaps the first legislated accountability effort with significant "teeth," is still evolving and state officials have demonstrated a serious commitment to it. However several factors limit its likely impact on vocational programs and student outcomes in the next few years: (1) difficulty collecting data, (2) lack of validity or reliabil-

ity of many adopted performance measures, and (3) inconsistent approaches to data collection and reporting within states. Certainly, the current system cannot provide a reliable, national picture of vocational education performance. Overall, the quality and reach of the Perkins accountability measures vary considerably by indicator, by state, within states, and sometimes even within local grantees' programs. It is therefore unsurprising that relatively few states or districts use the performance data for consequential decision-making.

- ***Although there have been some cutbacks in staffing dedicated to special population services, the full effects on programs and students are unknown.*** Even with the elimination of the gender equity set-asides and coordinator requirements, many states continued to support these efforts though the amount of staff time seems to have declined. In 2001, 23 states reported having at least one gender equity coordinator working full- or part-time, but case studies suggest these figures represent reductions from Perkins II. There were fewer observed effects at the local level, with other funding sources sometimes making up for the loss of Perkins gender equity grants. There were cutbacks in targeted programs and services in some communities but how these might affect student outcomes cannot be known for several more years.

B. Options for Future Directions[5]

Despite the current strengths of the vocational education system supported by Perkins III, there remain ongoing challenges for further improvement. Policymakers may wish to consider a variety of ways—encompassing broad or more specific strategies—in which to shape the course of these improvements. The approaches discussed here are based on evidence gathered through NAVE research activities, as described below.

1. Broad Strategies for Promoting Change

There are several possible options that have implications for the structure of a new or revised law. These broad strategies share a common goal of providing a clearer focus to federal priorities.

Transform Perkins into a program with clear, focused, and limited objectives.

The Perkins legislation is a stream of funds that provides wide latitude to state and local grantees in terms of implementation and goals. Historically, federal legislation has been built around two competing models: (1) a compliance model that holds grantees respon-

[5]Perkins III requires the NAVE to provide "findings and recommendations resulting from the assessment" (Section 114(c)).

sible for adhering to required inputs and strategies without regard for outcomes and (2) an accountability model that specifies one, or a small set of outcomes and allows grantees flexibility regarding the means for achievement. Perkins III contains elements of both models but does not appear to be clearly committed to either approach.

Perkins III reporting requirements reflect the historical accumulation of purposes that have been laid out for vocational education: improving students' academic and technical skills, enhancing high school completion and postsecondary enrollment, college completion, and successful labor market entry and retention.[6] All of these, it could be argued, are worthy objectives for federal policy to address at either the high school or college level, or both.

However, it is reasonable to question the capacity of any single law or any single program strategy to succeed on all of these fronts. The diffuse nature of federal priorities for this stream of funds both reflects and contributes to ambivalence among policymakers and educators about what "problem" is being addressed by the Perkins legislation, and impedes efforts to develop clear, focused, and tested education interventions designed to ameliorate the identified problem.

The federal investment could be more effective if directed toward a narrower set of goals around which program improvement strategies and accountability systems could be developed. There are some choices in moving in that direction:

- ***Emphasize immediate goal of education or workforce development.*** Decision-makers may want to weigh whether vocational education, or the activities the Perkins legislation supports, should most directly and immediately contribute to:
  - Education, in which the emphasis is primarily on learning academic or occupational skills (or both) while enrolled in school; or
  - Workforce development, in which the emphasis is primarily on job and other post-school outcomes.

  These various objectives are certainly interrelated and clarifying the priorities does not imply that vocational education cannot also have other benefits. Studies clearly link higher levels of learning and of educational attainment to success in

[6]Since the first federal vocational education legislation was enacted in 1917, the law has responded to changing needs and acquired new objectives. Initially, support for vocational education was a way to prepare immigrant and rural populations to work in factories and on farms. At some point it became a form of training that might appeal to less academically oriented students, perhaps helping to keep them in school by engaging them in activities most relevant to future employment. Over time vocational education was supported as a strategy to keep the United States internationally competitive, by delivering advanced technical training to meet the needs of an increasingly high-tech economy. More recently, vocational education has been promoted as a strategy to enhance academic learning and provide a clearer pathway to success in college.

the workplace (see NAVE Interim Report [Silverberg et al. 2002]). The language in Perkins III and of vocational advocacy groups suggest that effective technical skills rest on a strong foundation of academic proficiency. The question is, however, which of these goals is most critical for Perkins-funded activities? A focus is important for the federal role of promoting continuing improvement.

- ***Separate the high school and postsecondary components of the Perkins Act versus keeping them joined in the structure of the law.*** In some sense, secondary and postsecondary vocational education share many qualities. Both are elective choices rather than a required curriculum. Both serve an increasingly diverse set of students, who have widely varying purposes for participating and hopes for what they will accomplish. When secondary vocational education was clearly a program for developing occupational skills and preparing for immediate employment, the strategies at the two levels were similar. However, that may no longer be the case. Since the mission of high schools and community and technical colleges differ, as do the challenges they face, policymakers may decide that federal vocational education should play a different role at each level. For example, although federal policy may charge secondary vocational education with reinforcing high schools' learning objectives, policymakers may choose to more clearly tie postsecondary vocational education to workforce development outcomes.

Establishing separate policies and goals for vocational education at the two levels need not undermine the current federal emphasis on developing clear pathways from high school to postsecondary education. On the contrary, with two separate titles or sections, the law could more clearly articulate the specific responsibilities of secondary and postsecondary institutions to create and maintain those pathways.

Policy Option: Focus Perkins legislation more clearly

NAVE Supporting Research Evidence

- Federal vocational dollars are an important but relatively small share of both federal and local budgets: (1) Perkins appropriations declined from 6 percent of total Department of Education budgets in 1981 to 2 percent in 2004 (Chapter 1), and (2) best estimates suggest that local Perkins grants correspond to only about 5 percent of district spending on secondary vocational education and a somewhat smaller proportion of average community college expenditures (Chapter 5).

- Students in secondary and postsecondary vocational courses are diverse, enroll for different reasons, and expect different outcomes to result (Chapters 2 and 3); limited Perkins funds attempt to support the full range of efforts and students.
- Perkins III accountability requirements place responsibility for almost all possible secondary school outcomes on vocational education, perhaps because Perkins remains the largest single source of federal funds for high schools. Similar accountability requirements place the burden on postsecondary institutions to support a broad array of possible student outcomes (Chapter 5).
- In contrast, Title I of the Elementary and Secondary Education Act, with funding more than 10 times greater than Perkins, has been transformed by federal policymakers from a "stream of funds" into one that is unambiguously focused on one core goal: raising academic achievement (Chapter 1).
- Although high schools see preparing students for careers as an important mission, their primary focus over the last decade has been on improving academic achievement and transitions to college and the latter is at least a stated goal of most high school students (Chapter 1). In contrast, a primary goal of community and technical colleges, adult centers, and other eligible Perkins postsecondary recipients is job training; more than two-thirds of sub-baccalaureate vocational students enroll to upgrade their job skills or to get a terminal credential (Chapter 3).

Eliminate Tech-Prep as a separate title, folding its key activities into postsecondary institutions' responsibilities.

Tech-Prep has spurred some important efforts but has not lived up to its promise of creating rigorous programs of technical study. The Tech-Prep title of the Perkins Act has become a funding stream like the larger state grant title in Perkins, allowing local consortia to supplement vocational education or other efforts associated generally with the spirit of the law (e.g., career development). Rarely are funds focused on developing the well-defined two-plus-two (2+2) *programs* that early Tech-Prep advocates promoted: integrated high school academic and vocational curricula that are "articulated"—linked through credit transfer agreements—to postsecondary programs. Instead, integration and articulation have been implemented more on a course-by-course basis. Moreover, these two key components of Tech-Prep have become more common priorities for vocational education generally, diminishing the distinctive role that Tech-Prep efforts might play. Finally, there is some evidence that Tech-Prep funds are not as well targeted to high poverty as are the formula-driven basic grant funds under the Perkins Act.

Despite these limitations, Tech-Prep remains the catalyst for some initiatives and strategies that many consider worth preserving. Two, in particular, could instead become required activities for postsecondary Perkins grantees, many of whom already play this role as part of Tech-Prep consortia:[7]

- ***Convening local partners to collaborate on postsecondary transition issues.*** Some Tech-Prep consortia periodically convene local secondary and postsecondary institutions, employers, and community-based organizations to provide opportunities to coordinate professional development, talk about curriculum, or keep updated on changing requirements for college admission or entry-level workplace skills.

- ***Establishing and maintaining articulation agreements to promote students' more efficient acquisition of college credit.*** The expansion of articulation arrangements and the rapid changes in technology and economic conditions that generate modifications in postsecondary curricula make keeping articulation current more challenging. Some states have moved or are moving toward statewide articulation agreements in which the responsibilities for these agreements are already largely in the hands of postsecondary institutions.

This strategy could, in effect, focus the Perkins-funded efforts of eligible postsecondary institutions on serving their younger students (those transitioning from high school) rather than on the older adult population. Such an emphasis might be warranted, since the younger students are less likely to be on a stable trajectory toward labor market success: they have more limited work histories and less previous college or job training experience, and there is some evidence that earning a credential matters more for them than for older students. Given that Perkins grants represent about 2 percent of local community college spending on occupational education, a focus for federal funds on younger students might also strengthen current efforts to develop rigorous cross-level course sequences, pathways, or programs of study.

[7]Requiring postsecondary institutions to be responsible would not preclude other Perkins institutions—secondary districts, high schools, area vocational centers, adult centers—from playing major roles in these activities, as is appropriate. However, designating the lead institutions in law may help ensure that the activities are a focus of funded efforts.

Policy Option: Eliminate Tech-Prep

NAVE Supporting Research Evidence

- Definitions of a "Tech-Prep student" vary widely; enrollment in a single articulated vocational course is the most common measure (Chapter 4).
- Few consortia or schools implement Tech-Prep as a structured two-plus-two (2+2) program; implementation focuses on individual elements of Tech-Prep—articulation agreements, professional development on integration, improving career guidance and planning (Chapter 4).
- Tech-Prep funds are spent primarily on staffing a coordinator position—to oversee and organize meetings and articulation agreements—and on allocations to consortium members for new vocational programs, equipment, curriculum materials, and professional development. State grants to consortia are commonly awarded by a formula, but the formula rarely takes poverty into account (Chapter 5).
- In a majority of states, articulation agreements either exist or are underway for most vocational courses and programs (Chapter 4).
- Nearly half of younger vocational students (24 years of age or less) leave postsecondary education with eight or fewer months of course work (Chapter 3).
- Only 13 percent of younger vocational students have a prior college credential (usually a certificate), compared to 45 percent of older students (Chapter 3).

Streamline accountability requirements to align with the more focused objectives.

The current accountability provisions in Perkins III require secondary and postsecondary grantees to report on a broad array of student outcomes, both those that students achieve while in school (academic achievement, occupational-technical skill development, school completion) and those that define their paths after they leave (further education or training and employment). There are two reasons for reducing the number of indicators:

- ***Limit burden and improve performance data quality.*** Some states are using administrative records (centralized college records and records from state Unemployment Insurance systems), and more might do so with federal encouragement. However, many states without those options are finding it burdensome to meet all of the reporting obligations and currently their performance measures and data collection approaches have limited validity and reliability, impeding

reliance on them for significant program management decisions. Improvements in data quality and use are more likely if state and local grantees could concentrate their efforts on a smaller set of indicators.

- ***Focus program improvement activities.*** The accountability system is intended to motivate states, districts, and postsecondary institutions to manage their programs more effectively. A more limited set of performance indicators, closely aligned to policymakers' priorities for the federal investment, could encourage more targeted improvement efforts.

Policy Option: Streamline accountability requirements

NAVE Supporting Research Evidence

- State and local grantees have difficulty reporting several indicators—particularly occupational-technical skill attainment, further education, and employment; the reliability and validity of much of the data are poor (Chapter 5).
- State administrators report that poor data quality is one reason they do not currently view the performance data as useful for program improvement (Chapter 5).

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2. Specific Strategies for Improved Performance

Although there are broad changes to the structure of the law that policymakers could pursue, there are also individual practices and strategies new legislation could promote that might improve particular outcomes (Table 6.7). Ideally, one set of strategies would be emphasized, tied to a clear declaration of federal priorities. However, the strategies could also be implemented in combination.

Secondary Vocational Education

Enhance academic achievement, promote incentives for curriculum change and strategic investments in teacher training.

Improving academic achievement as a way to better prepare students for both college and careers is widely accepted as a primary objective of secondary schools. Over time, federal policy has increasingly emphasized the use of vocational education to support academic objectives at the high school level. However, although vocational students are clearly performing better academically than in the past, there is little evidence that vocational education has contributed to improved academic or postsecondary outcomes of most students, or that the academic emphasis in federal policy has so far significantly changed practice.

Table 6.7
Overview of Specific Strategies to Improve Vocational Program Performance, by Federal Priority

Federal Priority for Vocational Education	Improvement Strategies
Secondary Level	
Enhance academic achievement	▶ Make priority more explicit in law ▶ Support curriculum development strengthening academic content of vocational courses ▶ Limit funding to programs with proven academic content ▶ Invest in focused teacher training
Raise occupational and technical skills in high schools	▶ Require content and performance standards for vocational courses ▶ Promote aligned end-of-course technical assessments ▶ Include rewards and sanctions
Improve employment and earnings, particularly for noncollege-bound students	▶ Encourage implementation of vocational program course sequences ▶ Promote work experience programs
Postsecondary Level	
Improve employment and earnings	▶ Focus improvement efforts on younger students ▶ Work with high schools to give students realistic sense of college, training, and job requirements ▶ Place more emphasis on support services

If policymakers intend vocational education to be primarily, or more of, an instrument for academic improvement, several very substantial changes would be required:

- ***Identify the priority.*** Federal legislation would need to identify academic improvement as its primary objective, giving post-high school employment and earnings outcomes less emphasis. Having a clear, focused goal might help build consensus among vocational educators.

- ***Support curriculum development directly or through incentives.*** The content of most vocational courses and programs would have to evolve substantially, and teachers could not do it themselves. In fact, one barrier to greater integration of academic and vocational education has been that teachers have been left

largely on their own to modify their curricula. Inducement might be necessary to encourage change. One approach might be to restrict federal funds to vocational courses that demonstrated sufficient academic content to enable students to earn academic credit toward high school graduation. Such an approach would have to be reconciled with the new teacher qualification requirements under the No Child Left Behind Act.

- ***Invest in teacher training.*** Upgrading the vocational teacher workforce would be necessary, particularly given the relatively weak academic preparation of current and prospective vocational teachers. A policy similar to the "highly qualified teacher" requirement in the No Child Left Behind Act might be an important support.

Policy Option: Promote curriculum change and teacher training

NAVE Supporting Research Evidence

- On average, vocational courses do not seem to contribute to students' academic achievement (as measured by test scores) or the likelihood of enrolling in postsecondary education. Taking more academic courses, even lower level math and science courses, does enhance academic achievement (Chapter 2).
- Adjusting for student characteristics, students taking vocational education in high school eventually enroll and complete postsecondary education at rates similar to comparable students, but they enroll later and are less likely to attend four-year colleges (Chapter 2).
- After a decade of federal promotion, academic and vocational education are only somewhat better integrated, even within programs such as career academies and Tech-Prep, where integration is a goal (Chapter 2).
- Increasing numbers of states include academic content in vocational curriculum guidelines. But the guidelines tend to support basic skills, not higher-level academic competencies in math and science, and are not necessarily linked to core academic standards (Chapter 2).
- The vocational teacher workforce seems poorly prepared to deliver academic instruction: at least 9 percent of vocational teachers overall, and a higher fraction in area vocational schools, lack a bachelor's degree; vocational teachers preparing to enter the field score lower than prospective elementary school teachers in basic reading and writing tests. They score only slightly higher than prospective elementary school teachers in math but still lower than other secondary school teachers (Chapter 2).

- Although vocational educators widely acknowledge the importance of academic skills, many do not believe that it is their primary responsibility to help students in this area (Chapter 2).

Develop high school students' occupational and technical skills, require states to focus on whether students are actually learning—by establishing content and performance standards and assessments.

Vocational courses are electives in which students enroll for many different reasons. Some students are hoping for careers directly after high school, others are considering potential college majors, and still others are pursuing a personal interest. Although students envision widely varying benefits from vocational courses, they are all expecting to learn. Likewise, although vocational educators may disagree about most other outcomes, they generally agree that their primary objective is for students to acquire occupational knowledge and skills regardless of the path students take after leaving school.

Policymakers may therefore choose to focus on this most direct indicator of vocational program success as the way to promote program improvement. Unfortunately, this NAVE report, like all earlier ones, has little evidence about the impact of vocational education on students' knowledge of occupational and technical skills, largely because there are few well-validated ways of assessing those skills. Most states rely on vocational program completion, course grades, or high school completion for performance reporting to the Department on occupational-technical competency. Yet, these same types of teacher-assigned or "seat time" measures have largely been rejected by federal policymakers as unreliable indicators of academic learning.

One strategy is for policymakers to apply the standards-based reform model to vocational education. Federal support for high school vocational programs would be contingent on state implementation of standards and exams to directly assess whether students have learned the intended subject matter at a specified performance level. The components might include:

- ***Require content and performance standards for vocational courses.*** Although some states already have vocational standards in place, and many others have voluntary curriculum guidelines, several years would be needed to establish review committees of employers and educators to create and certify content and performance for every vocational subject the state wished to support with federal funds. This would encourage educators and employers to engage in a healthy debate over the kinds of occupational learning most appropriate at the secondary school level. And, just as is the case under the No Child Left Behind Act, states

might make very different choices about the scope of learning to be promoted in vocational education and the levels of performance expected.[8]

- ***Promote aligned end-of-course assessments.*** Within a specified time period—perhaps four or five years—states would be required to adopt and put in place an end-of-course exam system that students would be required to take upon completing a year's worth of course work. The growing use of industry-developed certification exams is a step in the right direction, but some states might purchase assessments from private developers such as the National Occupational Competency Testing Institute (NOCTI) or ACT, and others might create their own.

  Developing and implementing an assessment system is a particularly difficult and expensive undertaking in vocational education given the variety of subjects, the need to continually update to reflect changes in the field, and the desirability of combining paper and pencil with authentic assessments. Federal resources might be set aside for competitive awards to states, as they are under the No Child Left Behind Act, to support test development and administration. States might be encouraged to form consortia for this purpose.

- ***Include rewards and sanctions.*** A variety of performance incentives at the state and local program level could be introduced. For example, like the No Child Left Behind Act, if programs failed to achieve an acceptable student pass rate for two consecutive years, certain sanctions might apply. Initially grantees could be required to adopt an improvement plan (as is the case in Perkins III), but if student performance failed to reach satisfactory performance levels for three consecutive years, such programs might be required, for example, to use federal funds to enable high school students to obtain training at community colleges, online, or from other providers.

Policy Option: Encourage standards-based reform of vocational education

NAVE Supporting Research Evidence

- At most, 16 states use statewide assessments for federal reporting on students' occupational-technical competencies; most states allow local programs and teachers to determine whether students have acquired requisite vocational skill (Chapter 5).

[8]Some states might focus on the knowledge and skills needed to be successful in specific occupations; some might emphasize broader work readiness skills such as those highlighted by the SCANS report; still others might require students to demonstrate an appropriate level of technological literacy, an approach promoted by the Southern Regional Education Board.

- State interest in developing standards and assessments is growing; the association representing state directors of vocational education is leading an effort to identify knowledge and skills for 16 career clusters and eventually to develop assessments for each of them (Chapter 2).

Improve employment and earnings for the noncollege bound, emphasize coherence of vocational programs and work experience opportunities.

Not only do most students say they want to attend college, but increasing proportions are doing so. In addition, most high school students work and traditional distinctions between the work-bound and college-bound students are eroding. Consistent with these trends, federal policy and many local programs have moved away from emphasizing vocational education as preparation for entry-level jobs directly after high school.

On the other hand, a significant share of students may not reap the benefits of a postsecondary education or training experience. The official U.S. Department of Education dropout rate in 2001 was about 11 percent, although the percentage of students who fail to obtain a high school diploma is much higher.[9] Recent studies suggest that the dropout rate may be closer to one-quarter of entering freshmen (Sum and Harrington 2003; Greene and Forster 2003). Even among high school graduates, about one in five will not enroll in any postsecondary education and other students will attend but not complete. Students who do not plan to attend or who are unlikely to be successful in college are often disadvantaged in the labor market and have historically been the target group for vocational programs. If federal policymakers choose to focus on this sizable group, they might:

- ***Encourage student completion of vocational program course sequences.***[10] Although increasing proportions of vocational students "explore" by enrolling in courses in two or more occupational fields, there is some evidence (although mixed) suggesting that earnings benefits may be higher for students who concentrate their course taking in one program area.

- ***Promote cooperative education and other work experience programs.*** Nearly one-third of all high school graduates participate in some kind of work experience

[9]The National Center for Education Statistics (NCES) relies on the Current Population Survey, a national survey of households, to determine the number of 16- to 24-year-old youths who left high school without earning a diploma. NCES includes the attainment of a General Education Diploma (GED) in its estimates of high school completion. See Wirt et al. 2003.

[10]Although under Perkins III, funds cannot support single-course vocational programs, students have the option to enroll in only one course of an intended sequence of courses.

program, and a high share of these students choose not to enroll in postsecondary education. Preliminary analyses in one state suggest that taking cooperative education has a positive effect on earnings at least during the first year or two after high school graduation.

Policy Option: Emphasize vocational program sequences and work experience for noncollege bound students

NAVE Supporting Research Evidence

- Among high school graduates in 1992, about 12 percent had never enrolled in any postsecondary education by 2000 (Agodini, Uhl, and Novak 2002)
- Students who take at least three occupational courses are increasingly less likely to concentrate those courses in one program area (Chapter 2).
- State data suggest that the higher the degree of specialization and concentration in vocational course taking, the higher the earning effects (Chapter 2).
- Some analysis indicates that taking cooperative education as part of the vocational education experience may contribute to short-run earnings (Chapter 2).

Postsecondary Vocational Education

Postsecondary vocational participants are diverse and so is the set of options sub-baccalaureate institutions provide for them. Students enroll for different reasons (to earn college credentials, to upgrade job skills, to satisfy a personal interest) and have different characteristics—varying in age, work experience, and their need to balance career, school, and family responsibilities. Community and technical colleges offer short-term programs leading to certificates and longer-term programs culminating in associate's degrees; some of the courses are for-credit while others are not, and they are offered during the day and at night.

Despite this diversity in students and program strategies, the concern over clarity of purpose for Perkins is less compelling at the postsecondary level than at the high school level. Certainly, the federal investment in postsecondary vocational education is small and policymakers may want to focus that investment where it can do the most good. But postsecondary vocational education is more clearly connected to workforce development, with even students seeking a credential interested in their immediate or long-term job prospects. Thus, continuing to emphasize earnings and employment as key priorities is likely to be appropriate.

One clear way to improve earnings of postsecondary participants, though, is to increase their chances of getting a credential. More than two-thirds leave sub-baccalaureate institutions completing less than a year's worth of course work and fewer than half obtain a degree or certificate. Some evidence suggests that the economic value of just a single year in a community college vocational program is comparable to the value of a year in a baccalaureate-granting college. However, for those who complete more credits and earn a credential the economic returns are substantially greater. At least for women, the returns to earning a vocational associate degree were twice as large as for those taking similar amounts of course work but not earning a degree. Community college students who complete a vocational associate degree earn on average between 30 and 47 percent more than a similar high school graduate with no postsecondary education.

Charging community colleges with responsibility for improving earnings through credential attainment might involve the following components:

- ***Focus on younger postsecondary students.*** Compared to older participants (more than 24 years old), younger students accumulate more course credits, are more likely to enroll seeking a credential or to transfer to a senior institution, and are less likely to have a substantial work history to fall back on. There is some evidence that a certificate or degree matters more for younger than for older students in producing economic returns to vocational education.

- ***Work with high schools.*** Perkins postsecondary institutions could help ensure that incoming students have a realistic sense of how well prepared they are for their intended programs of study. All too often students meet high school graduation requirements but, when tested upon enrolling in community college, still require remedial courses before beginning course work in their major field. Anecdotal evidence suggests that some of these postsecondary students, seeing a long and difficult road ahead of them, become discouraged and often drop out or enroll in shorter, less demanding programs. In this role, postsecondary institutions might:

  - Administer a college placement exam to high school juniors so that prospective students would have an accurate read on the extent to which they are prepared for community college and time to cure their deficiencies;

  - Continue to extend articulation and dual enrollment programs to enable more high school students to experience the rigors of college-level course work and the potential for entering postsecondary education programs with earned credits.

- ***Emphasis on support services.*** Local Perkins postsecondary grantees often use federal funds to assist students in special populations, including help with child care and transportation. This funding focus is appropriate and should, perhaps, include an emphasis on academic tutoring and counseling services. A recent NCES publication suggests that changes in work and family status are among the most common reasons that students give for leaving postsecondary programs before completing them, although academic preparedness is also an issue (Bradburn 2002).

Policy Option: Increase credential attainment to promote earnings

NAVE Supporting Research Evidence

- Students enroll for various reasons; older students are generally seeking job skills and may already have earned a college credential; more than half of younger students hope to earn a college degree (Chapter 3).
- Degree completion rates are low for both academic and vocational majors in public two-year colleges; more than half leave without a credential (Chapter 3).
- Economic returns to postsecondary vocational education are positive and are particularly large for students who complete credentials (Chapter 3).
- The federal investment is small—about 2 percent of local postsecondary vocational expenditures (Chapter 5).
- Many postsecondary institutions use Perkins grants to cover support services for special populations, in addition to professional development (Chapter 5).

3. Promising Research and Evaluation Investments

Many questions about vocational education, particularly about how to improve it, remain unanswered. Given the time frame, resources, and broad set of questions given to this NAVE assessment, there is little opportunity to identify and rigorously test promising practices or programs in the field. Such efforts require focused investments and at least four years to find sites implementing strategies of interest (or put them in place through demonstrations), design the evaluations, and collect and analyze the data. However, these types of investments might begin to build a body of evidence about what works for improving the outcomes of high school and sub-baccalaureate students and, in particular, those who pursue vocational education as a major part of their studies. Policymakers may want to consider ways to ensure that some longer-term research and evaluation activities are pursued.

Among the topics that might be considered are:

- What is the impact of well-known, and now longstanding, vocational interventions such as Tech-Prep, career academies, High Schools That Work, and cooperative education?
- What specific curriculum strategies would help strengthen the academic content and impact of vocational courses?
- Would broadening vocational courses beyond job-specific skills training, as promoted by the "career clusters" movement, affect the observed labor market benefits of vocational education?
- What are effective strategies for career development, and how important is it to setting high school students on a successful path?
- What constitutes a "highly qualified" vocational teacher?
- What are effective strategies for increasing postsecondary retention and completion rates at the sub-baccalaureate level?

4. Closing

Vocational education, increasingly known as career and technical education, is a longstanding program whose place in American education continues to evolve. The broadening of its goals, the ongoing diversity of participants, and the changing education and labor market climate in which it operates, suggests vocational education is a flexible option for schools and students.

With this flexibility comes some challenges, however. At the high school level, participation in vocational education is an elective choice that faces increasing pressure from emphasis on academic improvement. For both secondary and postsecondary vocational education, the wide range of participants and objectives raises a question about how effective a role federal policy plays and whether that policy can or should promote a clearer set of priorities. This final NAVE report is designed to contribute to that discussion, by providing the most up-to-date and comprehensive assessment of vocational education in the United States and of the effects of the Carl D. Perkins Vocational and Technical Education Act of 1998.

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Washington State Workforce Training and Education Coordinating Board

NAVE Study Reports

Reports to Be Released in 2004[1]

Secondary Vocational Education

Implementation and Quality

Efforts to Improve the Quality of Vocational Education in Secondary Schools: Impact of Federal and State Policies, RAND Corporation.

Teacher Quality in Vocational Education, MPR Associates.

The Vocational Teacher Pipeline: How Academically Well-Prepared Is the Next Generation of Vocational Teachers? U.S. Department of Education, Office of the Under Secretary.

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Participation and Impacts

Trends in High School Vocational/Technical Coursetaking: 1982–1998, National Center for Education Statistics. NCES 2003-025.

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Vocational Education and Postsecondary Outcomes: Eight Years After High School, Mathematica Policy Research, Inc.

Career and Technical Education in Two States: Participation and Student Outcomes, MPR Associates and University of Texas at Austin.

[1]These reports will be available on the NAVE Web site: www.ed.gov/rschstat/eval/sectech/nave/reports.html.

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The Role of Distance Learning in Vocational Education, Jacques DuBois, Synergy Plus, Inc.

Efforts by Federal Agencies to Develop Occupational Curriculum for Entry-Level Workers, James Jacobs.