Efforts to Improve the Quality of Vocational Education in Secondary Schools: Impact of Federal and State Policies

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Contents

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Acronyms

AAI	All Aspects of the Industry
ACE	Assessment in Career Education
AVS	Area Vocational School
CC	Community college
COS	Course of study
CPS	Career Preparation System
CTE	Career and technical education
CTSO	Career and technical student organization
FCAT	Florida Comprehensive Assessment Test
FTE	Full-time equivalent
GPA	Grade point average
HSTW	High Schools that Work
IEP	Institutional Effectiveness Process
ISD	Intermediate school district
ITAC	Integrated Technical and Academic Competencies
JVS	Joint Vocational School
LEA	Local education agency
MCAS	Massachusetts Comprehensive Assessment System
MCCTE	Michigan Center for Career and Technical Education
MDCD	Michigan Department of Career Development
MDR	Market Data Retrieval
NAVE	National Assessment of Vocational Education
OCAP	Ohio Competency Assessment Profile
OCP	Occupational Completer Point
OMB	Office of Management and Budget
RCR	Respondent coverage rate
ROP	Regional occupational program
ROP/C	Regional occupational programs/centers
SCANS	Secretary's Commission on Achieving Necessary Skills
SREB	Southern Regional Education Board
SRG	Survey Research Group (RAND)
STAR	Standardized Testing and Reporting
STW	School-to-Work Opportunities Act of 1994
T&I	Trade and industry
TEKS	Texas Essential Knowledge and Skills
VoCATS	Vocational Competency Achievement Tracking System
WBL	Work-based learning
WIA	Workforce Investment Act

Preface

The National Assessment of Vocational Education — a congressionally-mandated study — is charged with evaluating the impact of the Carl D. Perkins Vocational and Technical Education Act of 1998, known as Perkins III, and preparing a report to Congress by July 2002. As part of that effort, the National Assessment of Vocational Education commissioned RAND to conduct a study to assess the quality of vocational education in the United States. The purpose of the study is twofold. It will provide evidence on the extent to which actual practice is consistent with legislative and other views of what constitutes "quality" practice in secondary vocational education. It also will provide evidence regarding how policies made at different levels of the education system enhance or impede implementation of quality practice. RAND's findings as described in this report provide some of the information NAVE needs to evaluate the impact of the Perkins Act and prepare its report to Congress. The database for the study was developed in 2001 and included case-study analysis and analysis of a national teacher survey. The case-study sample included seven states — California, Florida, Massachusetts, Michigan, North Carolina, Ohio and Texas — and four districts and schools within each state. The survey was administered to vocational and academic teachers in a nationally-representative sample of comprehensive high schools and vocational schools.

While the targeted audience for any NAVE research is the U.S. Congress, this study should be of interest to any policymakers and administrators involved in improving vocational education and secondary education more generally. Because the report contains specific descriptions of different state and local approaches, it might also be useful to state and local educators intent on gaining ideas for improvement of their programs.

This work was contracted by the U.S. Department of Education, Planning and Evaluation Services, and performed by RAND Education from November 2000 to August 2002.

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Acknowledgments

This study could not have been carried out without the cooperation of many individuals around the country. First, we thank the individuals at the state, district and school levels who helped schedule and organize the site visits, responded to our many queries and questions, and shared their views and insights on the issues that affect vocational education today. Because study respondents, as well as district and school sites, participated under conditions of confidentiality, we are unable to thank them all by name.

We also acknowledge the assistance of the NAVE staff — Marsha Silverberg, David Goodwin and Betsy Warner — in the design of the study and teacher survey. Several other individuals also provided review and feedback or advice on specific aspects of the research: Karen Batchelor, Dominic Brewer, Beverly Campbell, Margaret Ellibee, Kimberly Green, Norton Grubb, Phyllis Hudecki, Jim Jacobs, Jack Jennings, Jo Kister, Mikala Rahn, Nancy Raynor, Scott Snelson, Carole Stacy, Don Richards and Peggi Zelinko. We thank them all for their contributions.

The case studies were carried out by teams of researchers from RAND and MPR Associates. RAND staff included Cathy Stasz, Sue Bodilly, Tammi Oyodamari-Chun, Tessa Kaganoff, Sarah Remes and Dionne Barnes. MPR staff included Penni Hudis, Sarah Calderon, Ted Warburton, Jane Sanborn, David Singleton, Tawny Beal, Anna Sikora and Lois Lynn Deuel. The teacher survey was conducted by RAND's Survey Research Group, under the direction of Beverly Weidmer. Dan McCaffrey designed the survey; Brian Stecher, Cassie Guarino and Jennifer Hawes-Dawson assisted in the design of the survey instrument. Dan McCaffrey, Brian Stecher, Delia Bugliari and Vi-Nhuan Le assisted in survey data analysis. Many other staff at RAND and MPR provided administrative and research assistance to the project, especially Donna White, Donna Boykin, Karen Ross and Abby Robyn at RAND, and Shierra Merto, Kelsey Blakely, Steve Klein, Bob Fitzgerald and Elliott Medrich at MPR. Christopher Dirks and Donna Boykin assisted in the production of this report.

Finally, we thank Tora Bikson of RAND and David Stern of the University of California, Berkeley, who provided technical review and offered many useful comments and suggestions that greatly improved this report.

Executive Summary

The National Assessment of Vocational Education — a congressionally-mandated study — is charged with evaluating the impact of the Carl D. Perkins Vocational and Technical Education Act of 1998, known as Perkins III, and preparing a report to Congress by July 2002. As part of that effort, the National Assessment of Vocational Education commissioned RAND to conduct a study to assess the quality of vocational education in the United States. The purpose of the study is twofold. It will provide evidence on the extent to which actual practice is consistent with legislative and other views of what constitutes "quality" practice in secondary vocational education. It also will provide evidence regarding how policies made at different levels of the education system enhance or impede implementation of quality practice. RAND's findings as described in this report provide some of the information NAVE needs to evaluate the impact of the Perkins Act and prepare its report to Congress. They also yield lessons for the larger vocational education community by identifying strategies that can be adopted by schools, communities and states to improve the quality of vocational education programs.

Vocational and technical education is defined in Public Law 105-332 as organized educational activities that individuals need to prepare for further education and for careers requiring less than a baccalaureate degree. The educational activities are to offer a sequence of courses that provide individuals the necessary academic and technical knowledge and skills and to include competency-based applied learning. Federal funding for vocational education commenced with the passage of the Smith-Hughes Act in 1917, and since that time federal legislation has sought to shape vocational education in specific ways. Vocational education, like all education in the United States, has traditionally been the domain of states and local communities. The federal government plays an important role in education through its leadership and funding, but the vocational education "system" has no national standards or curriculum.

Over time, federal legislation has attempted to expand influence over state vocational education programs. Perkins III offered specific guidance on the kinds of improvements that a program should incorporate to enhance its quality. These improvements included

- integrating academics into vocational and technical studies;
- adopting challenging academic, vocational and technical standards;
- promoting understanding of "all aspects" of an industry;
- encouraging parent and employer involvement;
- building linkages to postsecondary education;
- expanding use of technology; and

- providing for professional development of teachers, counselors and administrators.

Importantly, Perkins III incorporated stronger accountability measures than previous legislation did. States now must develop and track four core performance indicators and meet specific performance targets. Federal funds can be withheld from states that fail to meet their targets.

Perkins III was signed into law on Oct. 31, 1998 and took effect in program year 2000, from July 1, 1999 through Sept. 30, 2000. Thus, it was in effect for less than one year when this study began. States in this study opted to use the last state plan submitted under Perkins II as a transition plan with only minimal changes. New state plans were submitted during the course of the study, but most were not implemented until the second program year, July 1, 2000–Sept. 30, 2001, after Perkins III was enacted.

The study noted three limitations at the outset: little time has passed to allow for full implementation of Perkins III or for its accountability measures to take effect; the reform emphasis in secondary schools is on higher academic standards and performance; and the federal resources are relatively small compared with state funding. Thus, the incentives to implement Perkins-related reforms are weak relative to reforms associated with other state or local policies.

Within this context, the study aimed to understand the extent to which the quality improvements identified in Perkins were being implemented and whether the new provisions in Perkins III were encouraging stronger implementation of the federal vision for vocational education.

Study Questions

This study of secondary school vocational education assessed the status of Perkins III at an early stage of implementation and the current quality of vocational offerings through five broad questions:

1. What are the purposes and philosophies of vocational education in secondary schools? Have these evolved in keeping with the Perkins legislation, and how do they differ among states?
2. What other education reforms are occurring, and how have these affected vocational and technical education within states and localities? What is the influence of federal and state policies at the local level?
3. What are the state and local efforts to improve the quality of vocational education, especially with respect to the quality improvements outlined in Perkins III? Does the implementation incorporate challenging academic and technical standards? How prevalent are the practices endorsed by Perkins, and do they differ for academic and vocational teachers and schools?

4. What is the impact of changes in Perkins III on special populations and other groups and the programs that serve them? Have changes at the state level affected service delivery at the local level?
5. What are the characteristics of Tech-Prep programs? Are the states' visions for Tech-Prep reflected in local practice?

Approach and Methods

The research proceeded along two strands: case studies of implementation on a selected sample of sites and a national probability survey of high school teachers.

The case studies for the secondary school study included seven states and a purposive sample of four districts and schools within each. The seven states — California, Florida, Massachusetts, Michigan, North Carolina, Ohio and Texas — were purposely selected for several reasons: each has a data system in place that provides accessible information about student achievement; for at least the school level; each had sufficient vocational program offerings; and overall the group balanced the need for geographic and demographic diversity.

Four school sites were randomly selected from a pool within each state that had either high or low student achievement relative to other schools in the state, after adjusting for the demographics of the students. The two high-achieving and low-achieving schools in each state also had vocational education enrollment that exceeded the state's median enrollment. As a whole, the schools balanced the need for geographic diversity, levels of population concentration/locale, and different types of vocational schools. The selection of schools that varied by student achievement was intended to shed light on the relationship between achievement and vocational education implementation — i.e., whether higher- and lower-achieving schools differed in their efforts to enhance the quality of vocational education. This selection method was imperfect, however, and this aspect of the analysis was not very informative.

The case studies were carried out from February through June 2001 and gathered descriptive information about the quality of vocational programs in the states, districts and schools using multiple data-gathering methods, such as interviews, focus groups and document analysis.

At the same time, RAND conducted a nationally-representative survey of teachers in comprehensive high schools and vocational schools. The survey was designed to examine whether the instructional, curricular and related activities in schools and classrooms correspond to quality practices as defined in the federal legislation. It also gathered information about teachers' backgrounds and their school and teaching environments. This report includes selected findings from the teacher survey where they inform the main study questions.

To assess the relative quality of vocational education programs at the study sites, the research team developed a set of quality indicators for selected program improvements

discussed in Perkins III. These indicators were based on scholarly and policy research and studies of practices and were used to develop the interview guidelines and teacher survey and to interpret the study data.

In addition to the limitations in Perkins III noted above, the case-study findings are limited to the states and localities in the study sample. The teacher-survey findings reflect teacher reports on their schools, students, and teaching and curricular practices. Although the survey was designed to gather information on the prevalence of practices discussed in the legislation, it did not directly ask about Perkins III or its implementation.

With these caveats in mind, the following sections present findings organized by chapter.

Reactions to Perkins III Specifications

Perkins III brought some policy changes intended to provide more flexibility to states and local grantees but also to hold them more accountable for their actions. Three specific types of changes concern Perkins funding, accountability and services to special populations and other groups.

State and local education agencies directed funds in line with legislative intent. Perkins funds were crucial for supporting technology-related activities at the local level.

Perkins III specified both allowable and required use of funds and also changed the allocation of funds so that a larger proportion went directly to local districts, from 75 percent to 85 percent of the total state allocation.

State expenditure of leadership funds was directed primarily at three areas: curriculum development and dissemination, professional development of vocational education teachers, and development of standards and assessments.

At the local level expenditures also appeared to be in line with legislative intent. Perkins funds were particularly crucial for supporting technology-related activities — equipment, software, Internet support and the like. However, the flexibility in Perkins also permitted states and local grantees latitude, which allowed for considerable variation in spending patterns across the study sites.

Accountability mechanisms in Perkins III were not yet in place.

The states in this study were in the first year of implementing their state plans and accountability systems at the time of the field study. They varied in their ability to comply with the reporting requirements of Perkins III. Most state data systems were still incomplete, although states that developed standards and measures in response to Perkins II were more prepared to comply than others were.

Few local sites had changed their data collection as a result of Perkins, although many reported changes to comply with state data collection requirements.

It is simply too soon to tell whether the accountability measures adopted in Perkins III will exert greater control over state and local expenditures and efforts.

The elimination of set-asides to fund activities in support of students from certain groups reduced staff dedicated to these students. The full impact of changes is not yet known.

Perkins III amended the definition of special populations but also eliminated the set-asides to fund activities in support of students from certain groups. While the latter change was intended to provide greater flexibility at the local level, it also raised questions about how services might be affected. Perkins III also required states to provide separate reports on the performance of students from special populations and to report on participation in programs leading to nontraditional employment.

Five of the seven states made reductions in state-level gender-equity staff — and sometimes other positions — as a result of the elimination of the set-aside.

Although a few local sites seemed pleased with the flexibility afforded in Perkins III, most reported possible negative effects, including staff reductions.

The study revealed a complex picture concerning participation and access. Four states had differentiated programs of study or alternative requirements for some students. In some cases, these requirements had improved services for students at the local level, but in others they isolated students or reduced their access to the highest-quality programs.

Respondents in the case studies and teacher survey indicated that vocational education programs enrolled a disproportionate share of students from special population groups — a perception that the study is unable to verify with the data at hand. It is certainly the case that in some localities vocational education was still perceived as the educational alternative for the academically less able.

The State Context for Efforts to Improve Vocational Education

Perkins III is implemented in the context of existing state and local education systems. This study examined three aspects of state context that can shape efforts to reform vocational education: education philosophy or vision, the structure and delivery system for vocational education, and the current and ongoing state education reforms, including those that affect vocational education.

States and localities embraced the broader vision of vocational education but faced significant challenges to achieving this vision.

Since the 1990s, the Perkins legislation advanced a broader and more flexible vision of vocational education that expanded the content to include academic and industry stan-

dards to a level that would prepare students for postsecondary education or for high-skill, high-wage careers. It also expanded the audience for vocational education to include students who might otherwise only follow a general or college-prep program of study. The study found that while many states and localities have adopted the spirit of this philosophy — and some have enacted specific policies to advance it — many barriers to reaching this vision were evident.

Reported barriers include a negative perception of vocational education as the alternative for students who will not succeed in a more academically rigorous program; a perception by parents that it will not lead to college; a perception by employers that it will not lead to technically oriented jobs; the status of vocational education as an elective course of study in all states; and the continued separation of academic and vocational programs in high schools, where concerns over academic achievement take priority.

The structure of state education systems varied. More centralized systems were more likely to be implementing significant reforms directed at vocational education.

Unsurprisingly, states have different structures for the delivery of general and vocational education that might greatly influence their implementation strategies. In this study, we characterized states' governance structures using two simple dimensions: the number and authority of agencies involved in decisionmaking and delivery of educational services and the extent to which decisionmaking and policy is decentralized. The relative uniformity or fragmentation of policy implementation can vary with a state's structural makeup.

State structures that are characterized by having fewer agencies to authorize and deliver services and a more centralized or uniform decision-making system tended to mandate policy changes that resulted in more coherent and uniform vocational programs. Clients tended to understand the system and to move easily within it.

State structures with decentralized authority and overlapping delivery systems promoted vocational improvement through voluntary means. The result was often more variety in program offerings but less coherence.

States emphasized reforms directed toward academic standards, assessment and accountability. Similar attention to vocational education was rare.

The study examined academic and vocational reforms in three general areas: standards, increased graduation requirements and assessment. It also paid particular attention to specific state reforms directed at vocational education.

All states had academic standards for general education. These were mandatory in five states. Only three states had mandatory vocational content standards.

Four states had increased high school graduation requirements, but these requirements primarily concerned academic subjects.

All but one of the states had adopted an accountability system with high-stakes academic tests that students must pass to graduate, although not all were in effect at the time of the study. Vocational assessments were in use in three states, but these were independent of the states' accountability systems.

By and large, local respondents' reactions to academic testing regimes were somewhat negative, even in states where testing was voluntary. Respondents acknowledged that the tests had helped raise academic standards in vocational and technical programs but often at the cost of vocational learning.

State and Local Efforts to Improve the Quality of Vocational Education

Perkins III provided guidance to states to improve the quality of vocational education by outlining several program improvements — as listed above — to enhance vocational educational quality, requiring states to address these elements in their state plans, and permitting use of Perkins funds to develop them.

Overall, the study found that states, districts and schools have made progress in implementing improvements defined by Perkins III but differ in the consistency and depth of their efforts. Because state and local policies might encourage similar improvements, it is difficult to gauge the precise influence of Perkins III.

States made progress in implementing some structural changes to support vocational and academic integration, but these did not always influence local practice. Local sites had few examples of high-quality integrated curriculum.

States and local districts and schools have made some improvements in implementing some of the structural features that support integration — for example, in adopting coherent sequences of courses in vertically aligned pathways or clusters. In some cases these changes represented true reform at the local level, while in others they are labels that have been adopted without much alteration to the status quo.

Many state-level activities to support integration, such as curriculum development, professional development or adoption of whole-school reform models — for example, High Schools that Work — had not significantly or consistently influenced local practice in the sample of sites visited.

The case studies provide little evidence of widespread adoption of integrated curriculum, although each local site could point to one or two programs that appeared to contain elements indicative of integration. Survey data indicated that vocational teachers' classes incorporated more elements associated with integration than academic teachers' classes.

Vocational and academic teachers had few supports to accomplish integration. Few teachers engaged in team teaching or had common planning time to meet with other

teachers — activities associated with more successful implementation of an integrated curriculum.

The emphasis on academic reforms had helped raise academic standards in vocational education — a core performance indicator in Perkins III — but often at the expense of vocational content.

State academic standards and assessments reportedly had widespread influence over vocational courses and programs at the local level. In particular, teachers reported reduced vocational enrollments stemming from pressure to meet higher academic standards and increased course requirements; reduced time on vocational tasks arising from increased time on academic requirements and test preparation; and possible reduced quality of instruction, given the emphasis of some tests on simplistic understanding and answers.

The case studies revealed several examples of state and local efforts to enhance the academic content of vocational courses so that these can receive academic credit. A fairly high proportion of vocational teachers — 41 percent — reported on the survey that at least one of their vocational classes received academic credit.

All states and most local sites reported using national or industry certification programs or state licensure requirements as they develop vocational courses and programs, but these were not available in all areas. More than half of the local sites had courses that earned industry certification.

Survey data indicated that academic teachers were more likely to report that state and district standards were relevant to their classes, while vocational teachers were more cognizant of industry standards. Most teachers reported that standards influenced their teaching.

On a survey-derived measure of overall quality of academic and vocational teachers' classes, academic teachers had the edge over vocational teachers.

Perkins III did not appear to stimulate "All Aspects of the Industry" or parental involvement to any great extent.

Perkins III had stimulated employer involvement. Vocational teachers had more involvement with employers than academic teachers did.

All states, districts and schools were adopting strategies to involve employers in vocational programs in various ways, although some local sites were clearly more successful than others.

Survey findings indicated that vocational teachers were significantly more likely to have contact with employers than were academic teachers, even those who taught career-oriented classes.

States promoted connections to postsecondary institutions in many ways, and some were apparent in the schools. Vocational teachers had more connections with post-secondary institutions than academic teachers did.

State mechanisms to promote connections between secondary and postsecondary institutions included statewide articulation or dual-enrollment agreements, computer-based counseling programs available to all schools, adoption of reform models that emphasize such connections, policies to support career planning, or scholarships. Of these, articulation agreements, career-planning policies and scholarships appeared to have most influence locally.

Career planning was fairly common in the case-study states and localities, but according to survey reports, infrequent nationwide.

Vocational teachers reportedly had more varied and frequent connections to postsecondary faculty and institutions than academic teachers did.

Perkins was important for funding technology-related improvements at the local level. Vocational teachers had more technology support and resources than academic teachers.

Several states and schools promoted technology skill development or computer literacy for all students, including vocational students.

About half of the local sites featured more high-tech programs to reflect new demands in the workplace, although few of these were cutting-edge. Instructional activities involving distance learning were rare.

Academic teachers were more likely than vocational teachers to report problems with technology availability and quality and reported being less prepared to teach technology-related skills.

All states supported professional development for teachers but had not provided the same level of support for counselors or administrators.

All states in the study promoted teacher professional development, but local support varied considerably.

Survey data indicated that academic teachers received more professional development on topics related to assessment, while vocational teachers received more on integration-related or vocational themes. About three-fourths of all teachers surveyed received professional development on academic standards, subject-matter content and technology.

Some states had lateral entry policies to promote vocational teacher certification. Most states and some local sites were also concerned about vocational teacher shortages, but few had data to support their concerns.

Impact of Tech-Prep and Related Federal Policies

Federal policy also intended to improve or support vocational education through Tech-Prep, the School-to-Work Opportunities Act of 1994 and the Workforce Investment Act . Tech-Prep is incorporated into Perkins III as a separate title and provides funds to create programs that will lead to attainment of an associate's degree at a community college and preparation for high-demand, technically-oriented occupations.

Only two states had structured, comprehensive tech-prep programs.

Only two states in this study had structured and comprehensive programs. In the other states, Tech-Prep programs had some identifiable characteristics, such as articulation agreements, but it was difficult to distinguish Tech-Prep courses or students from regular vocational education.

Some states also had statewide articulation agreements or dual-enrollment policies between high schools and community colleges. These policies, however, did not always enhance or support Tech-Prep as defined in Perkins.

School-to-Work has had some impact on vocational programs, but the Workforce Investment Act has had little influence.

Four of the seven states used School-to-Work funds to advance certain aspects of their vocational education programs. Respondents at nearly all the local sites in these states reported that programs begun under STW had become institutionalized and were continuing with local or state funding.

The Workforce Investment Act, on the other hand, has had minimal effect at the secondary school level in most states or local districts and schools. This is not very surprising because WIA is geared toward adult and postsecondary education.

Conclusions and Implications

These findings led to a number of conclusions related to the study questions and also to some broader implications about federal policy for vocational education.

What are the purposes and philosophies of vocational education at the secondary level? Have these evolved in keeping with Perkins legislation?

Many states and localities have adopted the spirit of the Perkins philosophy to broaden the content of and participation in vocational education in secondary schools, and some have enacted specific policies to advance it. However, many barriers to reaching this vision remain.

Chief among these barriers is the continuing marginal position of vocational education in secondary education relative to academic or general education — a state of affairs that has been noted in many studies and for some years. The new vision has not convinced

parents that vocational education will lead to college, which is the route that most favor. The Perkins legislation may contribute to this problem by continuing to define vocational education as education for work that requires less than a baccalaureate degree.

What other education reforms are ongoing, and how have these affected vocational and technical offerings within states and localities? What is the influence of federal and state policies at the local level?

All the states in this study have adopted reforms that emphasize higher academic standards and requirements, assessment of academic learning and greater accountability, but few have adopted similar reforms for vocational education. By and large, the state reforms are highly influential, and vocational education is caught up in the academic reform tide. Although these reforms may have helped raise academic content in many vocational courses, it often appears to be at the expense of vocational or technical skills and content.

State reforms also affected local data-gathering practices. While few local sites knew about the Perkins reporting requirements, many had changed their data systems or procedures to comply with state accountability needs.

What are the state and local efforts to improve the quality of vocational education, especially with respect to the quality attributes outlined in Perkins III?

States and localities differ widely in the consistency and depth of their efforts to implement program improvements. At this early stage of implementation, Perkins appears to have had an impact on some of these efforts, but has not stimulated improvements in all areas.

Most effort has been directed at improving integration, increasing standards in vocational courses, enhancing connections to employers and postsecondary institutions, and making technology-related improvements.

Efforts at integration appeared more successful at the structural level than at the curricular level. The case studies provide little evidence of widespread adoption of integrated curriculum within a school. Teachers do not receive the support needed to implement curriculum integration, such as common planning time during the school day. The survey indicated that vocational teachers' practices are much more in sync with the notion of integration than are academic teachers' practices.

In some localities, the state reforms directed much attention to improving academic rigor in vocational education. Similar efforts to improve technical rigor in vocational courses were less evident, although local use of industry standards was fairly commonplace in vocational programs and many programs attained industry certification.

Connections to employers are fairly typical in vocational programs — the case studies provided many examples of employer involvement in local programs. Vocational teachers have much stronger connections to employers than academic teachers do, and

they also have stronger connections to postsecondary institutions. The latter may stem partly from Perkins' support of Tech-Prep, which incorporates creation of articulation agreements between secondary schools and postsecondary institutions.

Perkins appears to play a crucial role in supporting technology needs associated with vocational programs. At the local level in particular, Perkins funds make a significant contribution. Although teachers are not always satisfied with the amount and quality of technology at their disposal, vocational teachers are much more satisfied than academic teachers are and they also feel more prepared to teach technology-related skills. Instructional practices that involve technologies are more common in vocational teachers' classes, but instruction through distance learning is infrequent.

What is the impact of changes in Perkins III on other groups and the programs that serve them? Have changes at the state level affected service delivery at the local level?

The full impact of the elimination of set-asides and other legislative changes on services to students is unknown at present. Staff devoted to serving special populations and other groups had been reduced in most of the sample states and in many localities. Although some respondents seemed pleased with the flexibility afforded in Perkins III, most reported negative effects. In addition to staffing reductions, some programs had been eliminated altogether. In a few instances, states have devoted resources to particular programs, which helped to maintain them locally.

It may prove difficult to assess the impact of legislative changes in Perkins III, as most states in this study were not yet collecting the data that complies with reporting requirements that differentiate students from special populations.

What are the characteristics of Tech-Prep programs? Are the states' visions for Tech-Prep reflected in local practice?

Data from this study suggest that Tech-Prep is conceptualized in different ways. Tech-Prep at the local level — where local consortia administer the program and act as fiscal agents — does not often reflect the state vision. Two states had structured and coherent programs, but the others varied considerably in how students and programs were defined. These findings are in keeping with prior national evaluations of Tech-Prep that noted similar issues in program implementation.

General Conclusions

The study noted at the outset that the timing of the research and some known limitations in the legislation would likely work against finding strong effects of Perkins III implementation. These initial hypotheses seemed to hold and, along with some other observations, lead to the overall conclusion that Perkins III remains a relatively weak policy instrument for implementing a strong federal vision for vocational education.

Perkins III was at an early state of implementation in the states at the time the study was conducted. Nonetheless, the study found some progress toward implementation, but individual progress varied.

As anticipated, state reforms appeared to have more influence over vocational education than did Perkins III. State policy emphasized academic achievement and accountability. Vocational education was not part of any accountability systems, even in states with vocational education standards and assessments. This influence was positive when it helped raise the academic standards in vocational education — one of the goals of Perkins III. But it also sometimes detracted from the core mission of vocational education to teach technical and career-related skills.

As anticipated, the financial incentives in Perkins III and even the stronger threat of losing Perkins funds for poor performance may not be enough to counteract the greater influence of state general-education policies. The case studies provided evidence that some states have a long way to go to be able to comply with Perkins reporting requirements.

Some implementation problems identified in the study can be attributed to state and local conditions — for example, the relative level of centralization and coherence of the state education system, the history of education reform within the state and related policies and practices already in place, and the relative importance of vocational education within the state education policy sphere. Implementation was less varied in states with more-centralized governance structures; these states also had more coherent policies directed specifically at vocational education.

A second set of barriers to implementing the Perkins' vision of an integrated academic and vocational education is the historical separation between academic and more occupationally-oriented education, which has been discussed in many studies. Vocational education and its teachers are marginalized and in the minority in most high schools, yet at the same time bear the biggest burden in making the kinds of changes required to achieve curriculum integration or other improvements.

The Perkins legislation also has some weaknesses that help create implementation challenges, which also have been documented in earlier studies. These include its origin in vocational education, which isolates the reforms from other education programs, and poor definition of key concepts, such as curriculum integration.

Like previous federal legislation for vocational education, Perkins III provided inducements to states in the expectation that states will deliver services to special groups, especially the economically disadvantaged. Like Perkins II, it incorporated capacity building mechanisms that directed funds toward specific program improvements. Perkins III added stronger mandates than prior legislation by holding states accountable for performance targets in four areas. These policy instruments were intended to reduce the slippage between policymakers' expectations and local implementation, which is expected to vary by state and local government levels.

This study found that Perkins policies were being enacted consistent with state structure, policy and interests but not necessarily consistent with federal intentions. Perkins III and concerns about vocational education are overshadowed by state academic standards and assessments and by accountability systems that often ignore vocational and technical learning. While study sites were aware of and working toward most of the quality improvements described by Perkins II and III, these efforts were largely on the margins of other state reforms.

On the positive side, Perkins funding undoubtedly plays a crucial role in state and local efforts to improve the quality of vocational education, especially in some areas. It is too soon to tell whether the stronger mandates in Perkins III accountability will have the desired effect, and some of the philosophical, structural and incentive barriers will not likely be overcome by time alone.

1. Introduction

The National Assessment of Vocational Education — a congressionally mandated study — is charged with evaluating the impact of the Carl D. Perkins Vocational and Technical Education Act of 1998, known as Perkins III, and preparing a report to Congress by July 2002. As part of that effort, the National Assessment of Vocational Education commissioned RAND to conduct a study to assess the quality of vocational education in the United States. The purpose of the study is twofold. It will provide evidence on the extent to which actual practice is consistent with legislative and other views of what constitutes "quality" practice in secondary vocational education. It also will provide evidence regarding how policies made at different levels of the education system enhance or impede implementation of quality practice. RAND's findings as described in this report provide some of the information the NAVE needs to evaluate the impact of the Perkins Act and prepare its report to Congress. They also yield lessons for the larger vocational education community by identifying strategies that can be adopted by schools, communities and states to improve the quality of vocational education programs.

The purpose of the study is twofold. It will provide evidence on the extent to which actual practice is consistent with legislative and other views of what constitutes "quality" practice in secondary vocational education. It also will provide evidence regarding how policies made at different levels of the education system enhance or impede implementation of quality practice.

The Changing Federal Role in Vocational Education

Vocational and technical education is defined in Public Law 105-332 as organized educational activities that individuals need to prepare for further education and for careers requiring less than a baccalaureate degree. The educational activities are to offer a sequence of courses that provide individuals the necessary academic and technical knowledge and skills and to include competency-based applied learning. The federal role in vocational education was clarified with the passage of the Smith-Hughes Act in 1917. Its purpose was to provide federal funding for vocational education in public secondary schools. Although vocational education programs were carried out in traditional secondary schools, the act separated them from other programs, thus contributing to the separation of the high school curriculum still present today (Hayward and Benson, 1993).

In addition, vocational education, like all education in the United States, has traditionally been decentralized and remains the domain of states and local communities. The federal government plays a catalytic role in education through its leadership and

funding, but the vocational education "system" has no uniform standards or curriculum.

From 1917 to 1963 the basic elements of federal vocational education did not change. The Vocational Education Act of 1993 designated "set-asides," or funds for special purposes, in an effort to expand influence over state programs. In particular, the act provided for experimental programs to meet the special vocational education needs of youth in economically-depressed areas or of those who had academic, socioeconomic or other handicaps that might prevent them from succeeding in regular vocational education programs. As Hayward and Benson (1993) noted, this was a significant policy shift: vocational education was now seen as the special refuge of downtrodden minorities and therefore less likely to compete effectively for state and local resources.

After the 1963 act, federal fiscal controls increased and expanded. The 1968 act, for example, included provisions for exemplary programs, cooperative education and work-study. The 1976 legislation incorporated concerns for improved planning, program improvement and support to overcome gender bias. The first National Assessment of Vocational Education, authorized in 1976, was influential in the passage of the Carl D. Perkins Vocational Education Act of 1984. This act placed more emphasis than earlier legislation did on improving access to vocational education programs, particularly for special populations, and on modernizing and developing program quality.

In 1990 Congress passed the Carl D. Perkins Vocational and Applied Technology Education Act, known as Perkins II, which contributed to another significant policy shift in federal funding for vocational education. Perkins II aimed to improve preparation for a competitive and highly-skilled workforce and sought to strengthen the academic and technical skills of students in vocational education by:

- "requiring the development of statewide performance measures and standards;
- integrating academic and vocational curricula;
- promoting two-plus-two Tech-Prep programs that link high schools with postsecondary institutions; and
- supporting work experience programs, such as apprenticeships and cooperative education" (NAVE, 1994a, p. 3).

With the inclusion of integration and articulation between secondary and postsecondary levels, Perkins II attempted to bring academic and vocational education into a more equal relationship and to enable students to develop and achieve both academic and vocational competencies (Hayward and Benson, 1993). For the first time, the act was directed toward "all segments of the population."

To ensure that states used Perkins funding to attempt to achieve this vision, the states were required to submit plans that described and justified how the funds would be used. Congress did not clearly define how states were to achieve curriculum integration or other program improvements; therefore, states had some leeway in implementation (Grubb, 1995). However, states had little discretion over the allocation of funds to local education agencies; this was largely determined by federal formulas based on entitlements for specific categories of underserved students or for specific programs to serve those students. These provisions ensured that the states could withhold for their use no more than 25 percent of the funding with a minimum of 75 percent going to the local agencies.

McDonnell and Grubb (1991) note that vocational educational legislation is more likely to be implemented if it is viewed as a fully funded mandate with strong incentives for compliance and strong capacity by implementers to actually do the work required. Others (for example, Mazmanian and Sabatier, 1989; McLaughlin, 1990) argue that implementation is more likely absent competing agendas, legislation or mandates that direct the implementers attention elsewhere or that result in a confused set of priorities for action. These authors also note that interaction among competing agendas and actors can delay or slow the progress of implementation.

Although Perkins II provides incentives for program improvement, as a policy instrument it is perhaps best described as a carrot without an accompanying stick. Given the small amount of resources allocated — about one-tenth of the total state expenditures in vocational education in 1994 — and the competing set of school reforms, it was not perceived as a mandate but as a set of guidelines. Had it been a mandate, it would have been sorely underfunded. Like previous vocational legislation that has been criticized for "trying to do too much with too little," Perkins II funding levels were not enough of a lure to entice states to change long-standing behaviors (Hayward and Benson, 1993). Perhaps

just as important, it was not clear if the local agencies, teachers, counselors, and administrators had the capacity to undertake such a significant and large-scale reform without much stronger incentives and much clearer implementation guidance. States were taking their own actions, which often focused on improving academic standards and assessments. Vocational education improvements were of lesser priority. Finally, the legislation lacked any kind of enforcement power on the part of the federal government. States were not denied funding based on weak plans, poor performance on indicators or lack of progress toward achieving the vision.

While Perkins II stimulated much reform at the local level, it resulted in initiatives of widely varying quality. Schools also seemed to fit the reforms into already existing curricula rather than making broad curricular changes (NAVE, 1994b, Volume I). Unsurprisingly then, Congress attempted to put more "teeth" into Perkins III. It also gave states still more leeway in use of funds. The main characteristics of Perkins III are as follows:

- The state plans have a stronger and more elaborate approval process. State must submit five-year plans, based on similar plans required by each locality that justified allocations, demonstrated measurement of the core performance indicators, and indicated how the state would attempt to improve on each indicator. Local plans must be driven by performance criteria set by states. Plans must address very specific issues, such as how the state would evaluate itself, how it would meet the needs of special populations, and so on. It also provided for specific allowable uses of funds, as discussed below.

- The development of the state and local plans required a consultative and inclusive process that involved teachers, parents and employers.

- The states are required to develop and track four core performance indicators and other indicators as proposed by each state. The states must negotiate with the federal government to establish benchmarks and targets for these indicators and to document improvements toward those targets. Each indicator included subindicators for special population groups. States must submit annual progress reports. If progress at the specified levels is not reached, then the local education agency must develop an improvement plan and the state must provide technical assis-

tance. Federal funds can be withheld from states and localities that fail to meet their targets after a one-year period of nonperformance of the "remediation improvement plan." States exceeding targets are eligible for incentive bonuses.

- Perkins III directed more funds to the localities by changing the maximum allowable withholding by the state to 15 percent, with 85 percent going to the local agencies.
- Funding set-asides for some specifically-defined groups were removed, and states were free to use the funds for other purposes, provided they met other targets.
- Perkins III included a separate funding title for Tech-Prep to promote preparation for high-demand, technically-oriented occupations.

Perkins III also described several attributes or characteristics of "quality" programs that, if implemented, would support its vision and specified that funds be used to enhance programs accordingly. In this way, Congress hoped to improve the quality of vocational education at the secondary level. The act specified the following quality improvements:

- Strengthen the academic, vocational and technical skills of students through the integration of academics in their vocational and technical programs of studies.
- Promote student attainment through the development and use of challenging academic, technical and vocational standards. All states were required to develop such vocational and technical standards as a requisite for accepting Perkins funds.
- Provide students with strong experiences in and understanding of "all aspects" of an industry to promote career preparation. Programs would not channel students into narrow preparation for a specific job.
- Encourage parental involvement in their children's career preparation decisions and employer involvement in providing guidance and support for school programs.
- Build strong linkages between secondary and postsecondary education levels so that students graduating from high school would be fully prepared for jobs or further education and could make a smoother transition.

- Develop, expand and improve the use of technology to better prepare students for the modern workforce.
- Provide professional development for teachers, counselors and administrators.

Perkins III followed the vision of Perkins II by focusing federal investment on improving the quality of programs, stressing certain attributes. The legislation presented similar guidance with respect to program improvements, required states to address these elements in their plans and permitted use of Perkins funds to develop them. In addition, Perkins III placed heavy emphasis on academic rigor and standards and supported the alignment of vocational education with state and local efforts to reform secondary schools and improve postsecondary education. It also held states and local education agencies more accountable than in the past for demonstrating results.

Perkins III was signed into law on Oct. 31, 1998 and took effect in program year 2000 — July 1, 1999 through Sept. 30, 2000. Thus, it was in effect for less than one year when this study began. States in this study opted to use the last state plan submitted under Perkins II as a transition plan with only minimal changes. New state plans were submitted during the course of the study, but most were not implemented until the second program year — July 1, 2000–Sept. 30, 2001 — after Perkins III was enacted. As discussed, some of the improvements were first introduced as part of Perkins II. Thus, we would expect to see more progress in implementation of integrated curricula, for example.

The main questions facing this study are the extent to which quality improvements designated in Perkins III are being implemented and whether Perkins III is encouraging a stronger positive implementation of the vision of quality first invoked in Perkins II. Given the set of expectations provided by the literature, we observe the following at the outset.

- Very little time has passed to allow for the full implementation of Perkins III or to allow for the accountability measures to take effect.
- While Perkins III has more "teeth," thus implying greater likelihood for implementation, it also is being enacted at a time of unprecedented emphasis on higher academic standards and performance that is taking up the time and energy of secondary school educators.

- Again, despite the "teeth" in Perkins III, the federal program provides relatively few resources compared to other resource streams available to implementers. Thus, incentives solely to implement Perkins are slim, while incentives to implement well-funded state and local policies that may or may not mesh with Perkins are relatively plentiful.

Study Questions

This study of secondary-level vocational education[1] assesses the initial impact of Perkins III on the implementation of the federal vision and the current quality of vocational offerings through five broad questions:

- What are the purposes and philosophies of vocational education at the secondary level? Have these evolved in keeping with Perkins II and III and how do they differ among states?
- What other education reforms are taking place and how have these affected vocational and technical offerings within states and localities? What is the influence of federal and state policies at the local level?
- What are the state and local efforts to improve the quality of vocational education, especially with respect to the key attributes outlined in Perkins III? Is the implementation rigorous in that it incorporates challenging academic and technical standards? How prevalent are the practices endorsed by Perkins, and do they differ for academic and vocational teachers and schools? How does Perkins III contribute to these improvements?
- What is the impact of changes in Perkins III on special populations and other groups and the programs that serve them? Have changes at the state level affected service delivery at the local level?

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[1] Vocational education at the "secondary" level — for young people who have not graduated from high school — is provided in a variety of settings including "comprehensive" high schools, which are schools that offer instruction in the full range of academic and nonacademic subjects, and vocational schools that emphasize education in vocational fields. "Postsecondary" vocational education presumes an older student and/or one who has completed high school or an equivalent educational program.

- Is Tech-Prep distinct from regular vocational education or is it part of a strategy for improving quality? Are the states' visions for Tech-Prep reflected in local practice?

The study does not attempt to answer all of the questions of interest to Congress or the U.S. Department of Education. Other National Assessment of Vocational Education studies will address other questions and elaborate on the questions addressed here. This study intends to provide descriptive information about policymaking and practice, to describe indications of the variation in practice that exists and reasons this variance occurs, and to highlight examples of current practice and any effects of Perkins implementation on that practice.

Methods

The research proceeded along two strands: case-study analysis of implementation in a selected sample of sites and a national survey of teachers.

The case studies include seven states and a purposive sample of four secondary schools and two community colleges in each. Again, the states are California, Florida, Massachusetts, Michigan, North Carolina, Ohio and Texas — see Appendix A for more information about the selection of the states. The case studies, carried out from February through June 2001, gathered descriptive information about the quality of vocational programs in the states, districts and schools, using multiple data-gathering methods. The case-study design and analysis focuses on the implementation of program priorities outlined in Perkins III and how the broader context affects resulting practices. It enables RAND to examine whether or how state policies affect vocational education policy and practice in the sample of districts and schools visited in each state. This report discusses state and secondary school-level findings; a companion report covers the postsecondary case studies (Hudis, 2002).

During the same period, RAND also conducted a nationally-representative survey of teachers in comprehensive high schools and vocational schools. The survey was designed to examine the extent to which instructional, curricular and related activities in schools and classrooms correspond to quality practices as defined in the federal legislation. This report includes selected findings from the teacher survey when they inform the main study questions.

Limitations of the Study

It is important for readers of this report to consider some limitations of the study. The first concerns the timing of the study. It was conducted during the second year of the legislation's enactment and as a result, it is possible that some anticipated effects of Perkins III may not have had time to materialize. Thus, this report should not be considered a final assessment of states' responses to Perkins III. On the other hand, some aspects of Perkins III — in particular, the recommended program improvements — are similar to the Perkins II legislation enacted in 1990. To the extent that Perkins II foreshadowed Perkins III, we might expect states to be making progress along those lines.

Second, although we purposely selected states according to a set of common criteria, they are not representative of the nation as a whole. Indeed, the contextual variation among the states is important for understanding whether and how federal policy is implemented. Thus, while the analysis will provide some insight into the latter, the findings cannot necessarily be generalized across the nation.

Third, the study relies primarily on self-reports by respondents — through interviews or as survey responses — on documents provided to the research team, on information gathered from states' Internet sites and on the most recent draft of each state's Perkins Plan made available to the research team. These varied sources of information do not always agree and indeed often contradict one another. The data are also time-sensitive, which means that states may have made progress in some areas since the time of our site visits or as planning has developed.

However, given these conditions, we have made every attempt to ensure accuracy and to resolve contradictions in our reporting and interpretation.

Roadmap for This Report

Following this introduction, Chapter Two of this report discusses the overall study approach and methods. Chapter Three discusses specific changes in Perkins III, including those that affect special populations and other groups. Chapter Four examines the state context for efforts to improve program quality, while Chapter Five describes state and local improvement efforts. Chapter Six examines Tech-Prep and other related federal policies. A final chapter

discusses conclusions and implications. Appendix A provides additional information about the selection of the states and schools included in the case studies. Appendix B describes the sample design for the teacher survey. Appendix C provides site summary tables from the case studies. Appendix D includes selected data tables from the teacher survey.

2. Study Approach and Methods

A main focus of the study was to investigate how states, districts and schools are implementing Perkins III to enhance vocational education quality. The study used a two-prong approach: a set of case studies in a purposive sample of schools to gather descriptive information about attempts to improve the quality of vocational programs at several levels and a national teacher survey to gather information about the prevalence of vocational programs and classroom practices. The two approaches provide depth and breadth in understanding the manner of and extent to which schools have attempted to improve vocational education quality as promoted by Perkins. This chapter describes the study approach and methods, beginning with the case studies.

The study approach has two strands: a set of replicated case studies in seven states and 28 schools and a national teacher survey.

Case Studies

The study adopted a replicated case-study design of seven states in a purposive sample of schools — four secondary school sites within each case-study state. This design was most appropriate because our interest was in examining and interpreting processes in real-world contexts, where the processes studied, such as practices and policymaking, were not easily separable from the context and where variables of interest outnumbered the units of study (Yin, 1994).

The case-study design and analysis focused on the implementation of program priorities outlined in Perkins III and how the broader context — state, district and school policies and reform initiatives — affects resulting practice. It addressed the five broad questions listed in Chapter One.

Sample Selection

The sample for the secondary school study consisted of seven case-study states and four "sites" within each state. A site consisted of a high school and its corresponding district office. The state selection was partly motivated by availability of student achievement data.

Because academic achievement is a main focus of high school efforts, we wanted to understand more about the relationship be-

tween student achievement and vocational education implementation. A school with a strong emphasis on academics, for example, might help raise the overall quality of vocational programs, an important goal of Perkins III. In contrast, lower-achieving schools that may be struggling to raise student performance would perhaps have more difficulties implementing the components of high-quality programs as identified in the legislation. To investigate this relationship, the design called for a sample of school sites that varied in student achievement. An alternative approach would have been to sample districts and schools with higher and lower levels of vocational student performance, but few states have systematic measures of performance on vocational or technical subjects.

To ensure sufficient vocational activity at sampled schools, the study design also restricted the sample to states that could provide a measure of the intensity of each school's vocational program. Finally, states were selected to include a wide range of values for a number of secondary characteristics, including geographic location, demographics and the overall structure of vocational education in the states chosen: California, Florida, Massachusetts, Michigan, North Carolina, Ohio and Texas.

In each state we randomly selected four schools — two higher-achieving and two lower-achieving — for site visits.

To identify schools within states, we developed models that adjusted student achievement to account for different background characteristics. This created a pool of higher and lower achieving schools where achievement was better or worse than expected, given the student body background.[2] Candidate schools — two higher-achieving and two lower-achieving — were randomly selected from this pool. In each state, the initial selection of schools was reviewed with state officials to help verify vocational intensity and to identify any sites that had particular problems that might make them unsuitable for study. If a school declined to participate, another was randomly chosen from the sample pool. (See Appendix A for further details on sample selection.)

All individuals and schools were promised anonymity as a condition of study participation. Throughout this report we adopt a convention of numbering the schools, using the state abbreviation (for example, CA, MA) followed by one or two for higher-

[2] The middle level — schools performing as expected — was discarded because a contrast between high-performing and low-performing schools is more likely to reveal a relationship between implementation and achievement if one exists.

performing schools and three or four for lower-performing schools. Table 2.1 summarizes the school sample.

Development of Quality Indicators

To assess "high-quality" practices in vocational education first required the development of an operational definition of the characteristics of high-quality practice, coupled with a set of indicators or criteria for determining variations in quality. The study team developed indicators for several of the program improvements promoted in Perkins III:

- promote the integration of academic and vocational education,
- incorporate challenging academic and vocational standards,
- promote understanding of "all aspects of the industry,"
- involve parents and employers,
- create links to postsecondary education,
- promote access for students from special populations,
- develop and expand uses of technology, and
- provide professional development to carry out the program improvements.

This list of improvements was determined in collaboration with the National Assessment of Vocational Education staff. While each state's plan needs to include information on all these elements, they are not necessarily equally important.

To create indicators, we reviewed the literature — including scholarly research, policy research and studies of practices — to identify characteristics associated with better outcomes. In most instances, the literature tends to be descriptive and does not quantify student learning or other outcomes. In creating indicators, some of the characteristics were emphasized more than others. For example, we paid more attention to gathering information on integration and technical and academic quality than to special populations or "all aspects."[3] The indicators were sent to several

[3] These decisions were based partly on the appropriateness of the case study and survey methods for gathering information and partly on the data already being gathered in other NAVE studies.

outside experts with extensive experience in vocational education programming for critique and comment.

Table 2.1
Summary of Secondary School Sample

Site ID	Performance	State	Is all or part of the vocational program conducted off site?	Vocational Intensity (% vocational)	Enrollment	% White	% Free Lunch	Locale
CA1	High	CA	Yes	49	2,160	31	25	Urban Fringe of Large City
CA2	High	CA	Yes	55	2,609	47	76	Urban Fringe of Midsized City
CA3	Low	CA	Yes	59	2,001	39	52	Midsized Central City
CA4	Low	CA	Yes	59	1,649	92	21	Midsized Central City
FL1	High	FL	Yes	18	663	69	27	Rural
FL2	High	FL	No	15	1,738	44	36	Urban Fringe of Large City
FL3	Low	FL	No	22	907	84	19	Urban Fringe of Midsized City
FL4	Low	FL	Yes	13	2,043	79	7	Midsized Central City
MA1	High	MA	No	29	1,116	67	25	Urban Fringe of Large City
MA2	High	MA	No	12	1,112	45	40	Midsized Central City
MA3	Low	MI	No	24	957	75	18	Urban Fringe of Large City
MA4	Low	MA	No	45	488	96	0	Small Town
MI1	High	MI	Yes	71	1,464	44	40	Midsized Central City
MI2	High	MI	Yes	44	1,828	92	0	Urban Fringe of Large City
MI3	Low	MI	Yes	41	1,461	95	9	Urban Fringe of Large City
MI4	Low	MI	Yes	11	1,154	97	8	Midsized Central City
NC1	High	NC	No	31	567	87	8	Rural
NC2	High	NC	No	29	1,496	59	18	Small Town
NC3	Low	NC	Yes	22	1,022	85	7	Rural
NC4	Low	NC	No	33	1,143	80	8	Urban Fringe of Large City
OH1	High	OH	Yes	23	1,095	42	67	Midsized Central City
OH2	High	OH	Yes	33	429	100	10	Urban Fringe of Midsized City
OH3	Low	OH	Yes	26	672	100	5	Rural
OH4	Low	OH	Yes	18	1,321	95	2	Large Central City
TX1	High	TX	No	100	326	49	42	Rural
TX2	High	TX	No	63	1,082	0	47	Large Central City
TX3	Low	TX	No	68	1,650	19	34	Small Town
TX4	Low	TX	No	63	1,028	16	55	Large Central City

NOTE: The measure used for vocational intensity varies from state to state and is somewhat imprecise. For some states, the number represents the percentage of students enrolled in a sequence of vocational courses. In other states, the number represents the percentage of students enrolled in any vocational class. Where student enrollment information was not available (Florida and North Carolina), we used the percentage of vocational teachers in a school as a proxy.

The revised indicators were then used in the development of case-study data collection instruments and the teacher survey items. They also were used in data analysis especially in determining whether and to what extent the case-study states and local sites were implementing the quality improvements specified in Perkins. Overall, the indicators worked fairly well for these purposes, although some components, such as participation of parents and employers, were easier to evaluate than others, such as technical rigor of the curriculum.

Instruments

Semi-structured interview protocols were developed to ensure that comparable data were collected across sites. These protocols had two sections: a set of closed-ended questions to set the context, including the respondent's background, experience, clarification of responsibilities; and a set of open-ended questions that could be tailored to the respondent's role or area of expertise. Protocols were developed for each type of respondent at each level, as well as for different methods of data collection — telephone interviews to screen potential sites, interviews and focus groups.

Procedures

Field researchers from RAND and MPR and two Department of Education project officers participated in a two-day training session that included an overview of the Perkins legislation and review of case-study protocols and fieldwork procedures.

Data collection began in February 2001 with two-day visits to state agencies. Prior to these visits, fieldworkers reviewed each state's Perkins Plan. We requested interviews with state-level staff who had responsibility or expertise in the following specific areas, irrespective of job titles:

- secondary and postsecondary directors of vocational education;
- Perkins program administrators;

- curriculum specialists in three target areas — health occupations, business, trade and industry;[4]
- administrators of Tech-Prep, STW or other career preparation programs;
- administrators for programs serving special populations and other groups; and
- administrators for economic development or with knowledge of the Workforce Investment Act .

Senior staff from RAND and MPR conducted elite interviews of 30–90 minutes using the interview protocols. In all, we interviewed 71 respondents at the state level.

Between March and June 2001, a team of two researchers visited each site. Preceding this visit, a staffer at each identified site was interviewed by telephone to gather more information about the program offerings, to verify information that had already been obtained from the state, district or school Web site, and to secure the site's participation in the study. In some cases, state officials elected to contact the sites to encourage them to participate.

At the district level we requested interviews with the following individuals:

- the superintendent,
- the vocational or Perkins program administrator, and
- the special populations and Tech-Prep coordinators.

At the school level we requested interviews or focus groups with:

- the school principal,
- the Perkins coordinator,

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[4] Because technical quality may be disciplinary-specific, it was suggested that the school-level assessment be limited to a small number of fields. Thus, to the extent possible, the design and data collection concentrated on three fields: health occupations, business occupations, and trade and industry. Business and T&I include the largest proportion of vocational teachers at the secondary level — 33 and 20 percent, respectively. These fields also enroll a large number of students: 52 percent of 1992 graduates earned business credits, 34 percent of 1992 graduates earned T&I credits (NAVE, 1994b). The health field is smaller, representing 3 percent of teachers and 14 percent of vocational concentrators in 1992 (NAVE, 1994b). Teachers from these fields were identified first for study participation; others were substituted when these were not available at a site.

- the vocational education department chair,
- guidance and career counselors,
- special populations administrator,
- teachers, and
- employers involved in vocational programs.

If they were available at the school, we interviewed teachers in health occupations, business, and trade and industry. We also held focus groups with other teachers, including academic teachers, and with employers who were connected to the vocational programs.

Each visit lasted from two to four days. In all, we conducted 97 district and 159 school-level interviews, and conducted focus groups with 14 teacher groups and 22 employers groups. (At some sites, additional teachers and employers were interviewed instead of participating in focus groups.) Additionally, we collected curriculum materials, school catalogs, school improvement plans, program descriptions and other documents that provided information about vocational programs and students.

The bulk of the school-level interviews occurred at the selected comprehensive high schools. However, in 12 cases, the comprehensive high school reported that some or indeed most of the vocational program offerings occurred at an associated school, usually an area vocational school. In these cases we interviewed staff from both the comprehensive high school and AVS because vocational students participated in programs at both sites. In four cases, most of the interviews were conducted at the associated AVS.

Case-study Data Analysis

Data analysis proceeded in stages. Information from state site visits was synthesized in a common format and distributed to fieldworkers prior to local site visits. As the school-level visits proceeded, fieldworkers synthesized information for each site, including documentary evidence, interviews and focus groups, for each of the main study questions. Separate reports were written for districts and schools except in smaller districts where administrators had responsibility for both administrative levels. Individual case reports were summarized for each of the quality

indicators. These state- and local-level summary reports provided the basic data for the case-study analysis.

A separate analysis was carried out on curriculum-related information. Although the original study design called for a curriculum assessment through review of lesson plans or similar detailed information gathered from teachers, very few teachers could produce detailed written curriculum documents. As a result we had to rely on other, more general information — course listings, school catalogs and program descriptions — or teacher interviews when time permitted. Although we did not have sufficient data to evaluate curriculum in depth, we reviewed all the curriculum-related materials for each site, using the quality indicators as a guide.

Analysis of High-Achieving and Low-Achieving Schools

As discussed, the study design called for a comparison of high- and low-performing schools to determine if they differed in their efforts to implement quality improvements in vocational programs. For example, to assess the extent of curriculum integration program improvements, we looked at whether or not a school was structured in ways that support integration — whether or not the school had stand-alone vocational courses, programs consisting of a sequence of courses, career pathways, career academies, pre-apprenticeship programs, or block scheduling. Details of this analysis are included in Appendix C. Overall, this analysis did not yield many clear patterns. A few trends appeared, which are discussed further in subsequent chapters. Our overall conclusion, however, is that high- and low-performing school are not implementing Perkins in significantly different fashion.

Several reasons might contribute to this null result. One reason concerns the joint delivery of vocational education at some sites. For example, a school might qualify as a high performer according to the statistical model, but the bulk of its vocational education students attend an associated area vocational school. The associated AVS might have lower performing students on average than the "home" schools from which their students are drawn. Because student achievement data is aggregated at the home school — or otherwise not readily available — it is not possible to model performance at the AVS. Similarly, a lower-achieving school might be associated with a particularly high-quality AVS. As discussed earlier, in nearly half of the sampled schools vocational

education was provided at a different nonsampled school in the district. This result stems partly from problems with the vocational intensity measure as seen in Table 2.1.

Second, a high-achieving school might be located in a low-performing district, which can affect its program implementation. Thus, choosing schools based on academic student achievement data did not always guarantee a higher- or lower-performing "site."

A third reason might be imprecision in measurement. While we could judge whether or not a school had a particular feature, it was not always possible to determine precisely the level of quality of that feature or indeed the extent to which it might contribute to student performance.

Finally, many of the characteristics we were looking for are considered to be good practice. Therefore, it is possible to see traces of them in any school.

Teacher Survey

The teacher survey utilized a national probability sample of secondary-school teachers in comprehensive and vocational high schools and area vocational centers.

While the case studies provide details about the vocational programs, the implementation of Perkins III program improvements, the impact of other school reforms on vocational education, and other important issues, the findings extend only to the small sample of states and institutions visited. The teacher survey utilized a national probability sample of secondary-school teachers in comprehensive and vocational high schools and area vocational centers. The main purpose of the survey was to assess the prevalence or extent of Perkins-prompted implementation strategies and whether these differ for different types of teachers and schools.

Sampling Frame

The universe for the survey included all vocational and non-vocational teachers of selected subjects in public secondary schools in the United States. To be consistent with the previous National Assessment of Vocational Education, the design limited the population of schools to include public comprehensive high schools and vocational schools or area vocational centers with 11th and 12th grade students. Our design was a two-stage stratified probability sample. The first-stage sample was a stratified random sample of schools. The second-stage sample was a stratified random sample of teachers from the selected schools. We

stratified schools into comprehensive high schools and vocational schools using definitions similar to those used in the previous NAVE study. The sampling frame was designed to yield samples large enough to provide precise estimates of the prevalence of practices for all vocational teachers and to compare them with academic teachers and among school types — comprehensive high schools and vocational schools.

The sampling frame of schools was based on a school list from Market Data Retrieval and confirmed with lists from the U.S. Department of Education's Common Core of Data Public School Universe files. We sent the lists of teachers from MDR to the school principals for verification of the accuracy of the frame. When available, we used the verified frame from the principal to draw our sample. If principals did not verify the frame, we used the MDR lists augmented by data from an alternative vendor, QED, to correct omissions in the MDR lists. (Further details of the survey sample can be found in Appendix B.)

The final survey sample included 339 schools and 1,572 teachers.

The final school sample included 134 vocational and 264 comprehensive high schools. The teacher sample included 2,958 teachers: 680 from vocational schools — 659 vocational, 21 academic — and 2,278 from comprehensive schools — 1,118 vocational and 1,160 academic. Of the sampled teachers, 54 percent completed the survey instrument and 5 percent reported they were ineligible for the study.[5] The overall response rate was 59 percent. The final survey sample, on which the analysis was based, included 339 schools and 1,572 teachers — 686 academic teachers and 886 vocational teachers.

Design and Development

In developing the survey, we relied primarily on the quality indicators and the previous NAVE teacher survey (Heaviside, Carey and Farris, 1994). The survey included questions about a range of school and classroom characteristics and practices and gathered background information on the teachers. Some items were re-

[5] The universe of teachers for the study includes all vocational and non-vocational teachers of selected subjects in public secondary schools in the United States. Secondary schools include comprehensive or regular schools as well as vocational schools and area vocational centers — only public schools. The universe excludes all itinerant teachers, unless their home base is the sampled school; substitute teachers; special-education teachers; and teachers teaching only physical education or music.

peated from the previous NAVE survey to provide information about trends over time. Strict time constraints on the survey of 30 minutes, specified in the request for proposal, limited the range and depth of questions that could be asked.

A draft version of the survey was sent for review to several outside experts, including members of the NAVE Advisory Panel. A pretest and focus group was conducted with seven high school teachers who represented the groups of teachers in the sampling frame. Feedback from all of these individuals was incorporated into the final version.

The survey items were organized into several sections to include questions about the school, the teaching environment, teaching in a specified class, vocational or career-oriented classes offered, and teacher background and experience. The final survey was submitted to the Office of Management and Budget for clearance.

Survey Administration

RAND's Survey Research Group administered the teacher survey between March and June 2001.

The research group contacted principals of each sampled school to inform him or her about the survey and to ask them to verify teacher lists and provide basic demographic information about the student population. Subsequently, surveys were mailed directly to sampled teachers at their school addresses. A gift coupon worth $10 was included. Multiple follow-ups were conducted and additional incentives offered to obtain completed surveys.

Survey Data Analysis

The basic analysis tabulated the data for the entire group of teachers and for subgroups of interest. The survey design supported the following types of analyses relating to the elements of quality practice that we defined and measured: a measure of the prevalence of such elements, estimates of prevalence across different types of teacher — academic versus vocational, experienced versus inexperienced — estimates of prevalence across types of vocational education disciplines, and estimates of prevalence in comprehensive high schools versus vocational schools.

All comparisons across groups were tested for significance using chi-square tests or t-tests adjusted where appropriate. The lin-

earization method (Skinner, 1989a) as implemented in the SUDAAN software was used to estimate standard errors for all estimates of population characteristics.[6]

In addition to the basic analysis, the survey data were analyzed with respect to school demographics, longitudinal comparison to the previous NAVE survey and policy-related questions of interest. The full survey analysis is reported separately. This report incorporates selected findings from the teacher survey where they inform the main case-study questions.

Table 2.2 summarizes the different sources of data gathered for the main topics discussed in this report.

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[6] The linearization method approximates nonlinear statistics, such as ratios, proportions and regression coefficients, with a linear approximation so that tractable variance formula can be used for nonlinear estimates. The standard errors account for sampling weights and the clustered nature of the sample design.

Table 2.2
Study Topics by Sources of Data

Study Topics	Data Source							
	Teacher Survey	State Interviews	District Interviews	School Administration Interviews	School Counselor	Teacher Int./Focus Group	Employer Int./Focus Group	Documentation
Philosophy/Purpose								
Structure/delivery system		X	X	X				X
Funding/accountability		X	X	X		X		X
Educational Reforms	X	X	X	X	X	X		X
Integration of academic and vocational education								
School structure/organization	X		X	X				X
Curriculum	X		X	X	X	X	X	X
Instruction	X			X		X		X
Work-based learning	X			X	X	X	X	X
Academic and vocational standards								
Presence and adoption of frameworks and standards	X	X	X	X		X		X
Academic and technical quality	X		X	X		X	X	X
All Aspects of the Industry		X	X	X		X		X
Involvement of parents and employers								
Extent and nature of parent involvement			X	X	X	X		
Extent and nature of employer involvement	X	X	X	X	X	X	X	X
Linkages between secondary and postsecondary								
Extent and nature of postsecondary connections	X	X	X	X	X	X		X
Career planning and counseling services	X	X	X	X	X			X
Technology								
Technology in vocational programs	X		X	X		X	X	X
Technology quality and availability	X		X	X		X		
Professional development for teachers, counselors, administrators	X	X	X	X	X	X		X
Special Populations								
Impact of Perkins III changes		X	X	X	X	X		
Access/enrollment in programs	X	X	X	X	X	X		
Programs and services offered		X	X	X	X	X		X
Tech-Prep	X	X	X	X	X	X		X

3. Reactions to Perkins III Specifications: Funding, Accountability and Special Populations

As discussed in Chapter One, Perkins III brought some policy changes intended to provide more flexibility to states and local grantees but also intended to hold them more accountable for their actions. This chapter discusses three specific types of changes in Perkins III: funding, accountability and services to special populations and other groups. The main issue of interest is how state and local grantees have responded to these changes and with what result.

This chapter examines two of the study questions outlined in Chapter One. With respect to funding and accountability, we are most interested in whether changes have supported the implementation of program improvements intended to improve vocational education quality — study question 3. With respect to special populations, we are interested in the impact of changes on students who are members of special populations or other defined groups and the programs that serve them — study question 4.

The analyses in this chapter are based on the seven state case studies and use data from interviews with state, district and school-level representatives, state Perkins plans, and other documents. The discussion provides a qualitative perspective of the impact of policy changes at a point when states are just beginning to implement them. Two other NAVE studies are examining issues related to funding and accountability in greater depth.

Perkins Funding

The Perkins Act provides grants to states, which then distribute funds to local secondary and postsecondary institutions, or districts, for vocational education programs. Resource allocation to states is by formula, which is based on population. Of the total funds available, 15 percent can remain at the state and 85 percent is distributed. The distributed portion represents an increase from Perkins II, where 75 percent of funds passed to local education agencies. Further, up to 10 percent of the funds earmarked for LEAs may be targeted to programs with two of the following characteristics: rural areas, high percentage or numbers of vocational

education students, or communities negatively affected by changes in the state secondary school formula, as further discussed below.

Within state, secondary funding for the first year, FY 1999, followed the Perkins II formula and was based on Title I eligibility at 70 percent, Individuals with Disabilities Education Act eligibility at 20 percent, and the number of students in LEAs and adults in training programs at 10 percent. Thereafter, secondary funds were distributed based on the youth population — ages 15 through 19 — within the LEA at 30 percent, and the low-income youth population within the LEA at 70 percent. States may propose to allocate funds using an alternative formula that more effectively targets funds on the basis of poverty.

The states have discretion in how funds are distributed between secondary and postsecondary and, to some extent, in the directives or guidance they give about spending. As can be seen in Table 3.1, with the exception of California, secondary institutions receive a greater proportion of Perkins funds than postsecondary institutions.

Table 3.1
State Allocation of Basic Grant Funds to Secondary and Postsecondary Institutions

State	Perkins Funding	Percentage Secondary	Percentage Postsecondary
CA	$113,226,995	41	59
FL	$50,037,449	53	47
MA	$17,323,922	75	25
MI	$36,920,789	60	40
NC	$29,143,015	67	33
OH	$43,458,582	80	20
TX	$82,285,930	58	42

NOTE: Funding represents final allotments for FY 2000 (Program Memorandum OVAE/DVTE 2000-9, Sept. 27, 2000).

In addition, the states make decisions about the allocation of state leadership funds — up to 10 percent or two-thirds of the 15 percent available to the state. But there are also limits to what states can do, as Perkins III requires that state leadership funds be used for services that prepare students for nontraditional employment, which is discussed further in the following section, and for activities that support: professional developmental programs that integrate academic and vocational education; partnerships of local education agencies, institutions of higher education and adult education providers; and programs for special populations [Section

124 (b)].[7] States also may use funds to support education and business partnerships, development of articulation agreements, vocational student organizations, technical assistance for local programs, guidance and counseling, and several other activities [Section 124 (c)]. The act requires the state plan to discuss how the funds will be used to enhance program quality — for example, how the state will use the funds to improve or develop new courses, improve the academic and technical skills of participating students, ensure that participating students are taught the same challenging academic proficiencies as other students, and link secondary and postsecondary education [Section 122 (c)].

The act has similar requirements for local funding and emphasizes use of funds to promote activities that improve program quality — integration, technical rigor, etc., as outlined in Chapter One — as well as to make provisions for serving students from special populations [Section 135 (b)].

Perkins funds make up a small percentage of funding for vocational education

Because Perkins funds make up a small proportion of total funding for vocational education and because activities may be funded from several sources, it is not always possible to tease out the precise contribution of Perkins. This study did not carry out an audit of expenditures, but relied on interviews and documentation to determine whether funds were directed in the manner intended by Congress. State and especially local-level respondents were not always sure themselves about the precise source of funds. In addition, at the time of the study, the distribution of funds was still in the planning stages and specific allocations may have changed. With these limitations, the next sections present findings on state and local uses of Perkins funds and provide specific examples to illustrate key findings.

State Uses of Funds

Most states funded curriculum development and dissemination activities

As discussed above, Perkins III specifies both required and allowable uses of state leadership funds. Data from interviews and state plans suggest the following general findings with respect to state uses of Perkins dollars:

Funding curriculum development and dissemination activities was a high priority in most states — Ohio, Texas, North Carolina, Michigan and Massachusetts.

[7] Throughout this document, specific references to Perkins III, PL-105-332, appear in brackets.

- Ohio is developing the Integrated Technical and Academic Competencies, which integrates technical with state-adopted academic standards. These replace older curriculum guidelines and tests that emphasize vocational content only.
- Texas is using $1.4 million in Perkins funds to develop the Texas Essential Knowledge and Skills[8] in career and technology areas. Perkins II funds were used to develop the "essential knowledge and skills" for vocational courses, the precursors to Texas Essential Knowledge and Skills.
- In Michigan, Perkins funds support curriculum development activities as well as the Michigan Center for Career and Technical Education, a clearinghouse for state-developed curriculum.
- North Carolina is continuing to develop and update course "blueprints" and to align them with national standards. Materials for several vocational courses of study are developed and distributed in a CD-ROM format.

The second most frequent use of Perkins funds in the states was for professional development activities.

The second most frequent use of Perkins funds in the states was for professional development activities.

- Massachusetts requires local sites to use 15 percent of their Perkins funding for professional development activities for their vocational education teachers.
- All the funding for Workforce Development Education professional development activities in North Carolina has come from Perkins. Conference topics include curriculum integration, accountability and addressing the needs of students from special populations. According to state officials, about 4,000 teachers have received staff development on the Vocational Competency Achievement Tracking System[9] since 1996.

[8] The Texas Essential Knowledge and Skills are a set of content standards in several academic subjects that districts must use in their foundation courses. TEKS in other areas, such as career and technical education, are voluntary and offered to districts as curriculum guidelines.

[9] The Vocational Competency Achievement Tracking System applies to all 112 vocational programs of study in North Carolina and includes course blueprints, detailed curriculum guides and a computerized assessment bank of 600–800 test items per course. It is used for developing course-related assessments, such as course pretests, quizzes and final exams.

- Texas' state trade and industry conference will focus on teachers' technical skills and include free automotive service excellence certification training for teachers.
- Florida has run teacher seminars on integration and Tech-Prep and pays salaries of individuals to provide professional development in the different regions.

Several states earmarked Perkins funds to develop standards and assessments in keeping with Perkins's intent to improve the academic and technical quality in vocational education.

Several states earmarked Perkins funds for standards and assessments.

- Funding for the Vocational Competency Achievement Tracking System in North Carolina has come from Perkins II and III.
- Massachusetts is developing standards for vocational courses called Certificates of Occupational Proficiency. These will be awarded to students successfully completing a comprehensive education and training program in a particular trade or professional skill area.
- California is developing standards for career and technical education with the goal of having them adopted by the state's board of education. It is also using funds to expand participation in the voluntary Assessment in Career Education tests and to promote the infusion of career material into the state achievement tests.

In some states, Perkins funds are considered a significant resource for development of underfunded vocational education programs. Massachusetts, for example, will use leadership dollars to hire someone to oversee collection and analysis of accountability data. At the time of our visit, this position was unfilled. Respondents in other states, such as Florida and Ohio, viewed Perkins funds more as an addition to what they were already doing. Many respondents in these states sensed that state policies for vocational education reform were well in hand and that the state was well ahead of Perkins III.

Local Uses of Funds

Interviews with local grantees and documents collected at districts and schools provided some information on how Perkins funds were being used locally. Within states, no evident funding patterns were associated with higher- or lower-achieving schools in the sample. Across states we found some general patterns, but also

much variation in specific activities within each general funding category. The main findings, with some illustrative examples, are as follows.

At the local level, the most common use of Perkins funds was for technology-related purposes.

First, the most common use of funds was for technology-related purposes: all but four local sites — two each in Ohio and Michigan — reported using funds in this manner.

- The types of activities funded varied. At two Texas sites, for example, funds were used to network computers to the Internet. Other sites purchased equipment or software.
- Many local respondents expressed the view that Perkins funding was crucial for meeting their technology needs — for example, one respondent commented, "If it wasn't for Perkins, we'd be dead."
- In one of the Ohio sites, Perkins funds were purposely not used for technology because the local compact had instituted a tax for each participating school that was used for this purpose. Teachers reported that they had all of the technology-related resources that they needed.

Local sites also devoted Perkins funds for professional development activities.

Professional development activities also were highly supported: each site in California, Florida, Massachusetts and Ohio used funds in this manner. Michigan was the only state where none of the local sites supported professional development activities with Perkins monies.

Local education agencies also targeted funds for curriculum integration and, to a lesser extent, toward enhancing academic and technical rigor of vocational education courses.

- All the Massachusetts sites, for example, reported using Perkins funds to align their vocational curriculum with the state testing system.
- A Florida site provided release time for math and vocational teachers to work together on integrated curricula.

Many local education agencies used Perkins funds to support personnel costs.

Overall, fewer LEAs directed funds toward activities to involve parent or employers or to create links to postsecondary institutions. The exception was Ohio, where all sites reported using funds for these purposes.

In several sites, local Perkins funds were directed toward personnel costs. North Carolina did not report using any funds in this manner.

- At least one site each in California, Massachusetts, Ohio and Florida used Perkins funds to hire personnel to work with special populations. All four Michigan sites used funds in this way.
- Sites in Florida, California, Massachusetts, Texas and Ohio — one site in each — supported guidance staff.
- Work experience or career and technical education coordinators were funded in California, Florida, Texas and Michigan — one LEA in each.
- All four Ohio sites reported using Perkins funds to hire vocational education teachers. One Massachusetts LEA did likewise.

All of the Ohio sites reported using Perkins funds to market their programs. As will be discussed further in the next chapter, respondents in some states thought that vocational education had a poor reputation and they faced an uphill battle to attract students into their programs.

Overall, the pattern of funding activities at the local level appeared to be consistent with Perkins's intentions: funds were directed at program improvements, such as technology and professional development. In addition, many LEAs used funds to support personnel. However, the local sites reported differences in the process of fund allocation from the state level and in the flexibility they had with respect to using funds. In some instances, funding to LEAs was contingent on state or local policies and directives. In Michigan, for example, the intermediate school districts controlled the funding; site MI2 reported that their ISD would not allocate any funds to schools that did not offer career pathways or the state-approved educational development plans. Some schools might object to the rules and as a result not request any Perkins money.[10]

Other local sites appeared to have much more discretion. In some LEAs in California, for example, final funding decisions were made at the district level typically by the vocational education director or coordinator. Other sites had site-based management, so final funding decisions were made at the school.

Local education agencies vary in the amount of discretion they have to make funding decisions.

[10] We heard similar reports in Ohio about the rejection of Perkins funds because of its requirements or the effort involved to qualify relative to the amount of funds available. Although we were not able to do so in this study, it would be interesting to quantify the number of schools in the country that choose not to participate in the federal program.

In some cases the planning process was participatory and local grantees could discuss the process in detail. At other sites, notably those in North Carolina, the source of funds was described as "invisible": local grantees were uncertain about whether their funds came from Perkins or other sources.

Perkins Accountability Requirements

Perkins III established a state 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" [Section 113 (a)]. States are required to set performance standards, to gather data on performance and to report performance outcomes. States also must report data separately for certain special population groups. The intent not only is to demonstrate measurable improvement for vocational education students but also to provide information that would lead to program improvements.

While Perkins II required states to describe their programs and justify their expenditures, Perkins III calls for sustained and demonstrable statewide progress toward improved student achievement in vocational and technical education.

While Perkins II required states to describe their programs and justify their expenditures, Perkins III calls for sustained and demonstrable statewide progress toward improved student achievement in vocational and technical education. States must negotiate with the federal government to establish performance benchmarks and targets and document improvements toward those targets. If a state falls short, it must develop an improvement plan. Federal funds may be withheld from states that fail to make progress. States exceeding benchmarks may be eligible for incentive funds. At the time of this study, states were still in the planning stages.

The specific reporting requirements center on four core indicators:

- Student attainment of challenging state-established academic and vocational competencies.
- Student attainment of high school diploma, equivalent, or postsecondary degree or credential.
- Placement in, retention in and completion of postsecondary education or advanced training, employment, or the military.
- Participation in and completion of vocational and technical education leading to nontraditional employment.

In addition to these core measures, states also can choose to gather and report on additional measures.

States reported spending a good deal of time discussing the reporting and accountability changes in Perkins III with local grantees who need to gather the information. In some cases, intermediate districts or regions compiled information and reported to the state. In other cases, as in Texas, raw data are reported directly to the state for further analysis.

Table 3.2 briefly summarizes the accountability systems in the seven states. Data from interviews and examination of relevant documents revealed several patterns.

First, state respondents noted that Perkins II helped set the stage for accountability by requiring states to develop performance standards and measures. This requirement clearly influenced some state actors, but not all, to think carefully about their assessment and data-gathering systems.

- Perkins II appeared to strongly influence development of data systems in Ohio and Florida.
- States with more-developed systems tended to see more positive effects from Perkins III, such as encouraging improvements in data quality and forcing local providers to concentrate their efforts on raising student attainment.
- In states lacking adequate data systems — for example, California and Massachusetts — respondents voiced a good deal of concern about their ability to meet reporting requirements. Some expressed frustration over the costs associated with implementing an accountability system and the lack of federal resources for implementation of accountability provisions.

States that developed measures and standards under Perkins II tend to have a more positive view of Perkins III accountability measures.

Table 3.2
Status of State Accountability Systems

	Secondary	Postsecondary	Ability to Report on Secondary-Level Perkins III Core Indicators
CA	No statewide system for individual student data.	Student-level information system that includes Social Security number as a unique identifier.	Just beginning to collect data. Not yet developed a statewide database.
FL	Statewide system linking databases through Social Security numbers.	Statewide system linking databases through Social Security numbers.	Occupational Completer Point system is comparable to Perkins III, but unable to calculate measures of academic success.
MA	Student Information Management System under development, will merge MCAS and Career and Technical Education reports to meet requirements.	Career and Technical Report and Community College Measurement System meet postsecondary reporting requirements.	Unclear. Some state officials thought data already collected satisfied most of the requirements, others disagreed. Unable to disaggregate data to report on all special populations.
MI	Vocational Education Data System provides individual student data, including special populations.	Postsecondary accountability uneven. Use Integrated Postsecondary Education Data System and various sources. Unable to calculate some measures.	Secondary-level data system is nearly complete. Unable to disaggregate data to report on all special populations.
NC	ABCs of Public Education system evaluates school performance gain against an expected growth composite. VoCATS measures vocational achievement but is not included in the accountability system	ASSET tests measure entrants' academic skills used by 65 percent of community colleges. Problems disaggregating academic and technical proficiencies.	State's internet-based Planning and Performance Management System supports detailed tracking of student participation and provides disaggregated data for each special population group.
OH	Electronic Management Information System provides individual student data for all secondary districts.	Higher Education Information System incomplete. Unable to establish performance targets due to lack of data	Unable to disaggregate data to report on all special populations.
TX	Public Education Information Management System, combined with Texas Assessment of Academic Skills, Academic Excellence Indicator System, and Automated Student and Adult Learner Follow-up System.	Community and technical colleges' Institutional Effectiveness Process set up continuous improvement process for institutions and programs. Ten of 60 effectiveness measures relate directly to Perkins.	Some data not yet available.

Second, the states vary a great deal in their ability to comply with the reporting requirements of Perkins III.

The states vary a great deal in their ability to comply with the reporting requirements of Perkins III.

- Several are unable to provide complete information disaggregated by special population groups — for example, Ohio, California, Michigan and Massachusetts.
- With the exception of California and Florida, the data systems at the secondary level are more developed than at the postsecondary level, and therefore states are more likely to be able to provide better and more complete data on secondary outcomes.

Third, at this point in time, no state reported using this vocational outcome information for program accountability improvement purposes at the local level.[11]

No state reported using vocational student outcome information for program improvement purposes at the local level.

At the local level, very few sites explicitly reported knowing about Perkins III's new accountability requirements. Sites in Ohio — a state that began changing their data systems with Perkins II — and Massachusetts had the most knowledge.

Few local sites changed their data collection as a result of Perkins, although several sites in Michigan reported taking data collection more seriously. Local sites did report changing data systems to remain in compliance with state requirements. These state requirements may or may not be consistent with federal requirements under Perkins.

All local sites report collecting performance data, but it is not necessarily for meeting Perkins requirements.

- All sites in North Carolina collect data for the Vocational Competency Achievement Tracking System, not Perkins. Florida sites focus on the Occupational Completer Points and completion rate data.
- Sites in California, Massachusetts and Texas reported problems gathering needed data.

In five states, only one school site reported using data for program improvement purposes — two sites each in Texas and Michigan.

- A few sites in Florida and Massachusetts reported a desire to use data for program improvement, but respondents said

[11] In Florida, however, student performance affected funding at the postsecondary level.

they were not getting the needed feedback or data from the state to accomplish this.

- Two North Carolina sites report using VoCATS scores for program improvement.

Although there are some exceptions, Perkins III does not appear to have had a great effect on states' or schools' data collection activities thus far.

Overall, the study findings indicate that Perkins III does not appear to have had a great effect on schools' data collection processes. State requirements dominate local data collections. Sometimes, these are consistent with federal requirements. Data are not yet used widely for purposes of program improvement.

Vocational Education for Special Populations

One of the significant differences between Perkins II and Perkins III involves regulations associated with special populations. First, Perkins III expanded the definition of special populations to include single parents, displaced homemakers and single pregnant women, in addition to individuals with disabilities, economically-disadvantaged students, individuals preparing for nontraditional employment, and individuals with limited English proficiency or other barriers to educational achievement.

Second, Perkins III eliminated the "set-asides" — the requirement that the small percentage of money still controlled by the state must be spent in a certain way. Perkins II reserved 10.5 percent of state leadership funds for programs for single parents, displaced homemakers and single pregnant women and not less than 3 percent for gender-equity programs. A further 0.5 percent could be used for all these. States were required to have a full-time gender-equity coordinator to administer programs for single parents, displaced homemakers and gender equity. There was a requirement for local recipients to give priority for funding to programs that served the largest numbers of special population members — individuals with disabilities, individuals preparing for nontraditional employment and individuals with limited English proficiency or other barriers to educational achievement.

In Perkins III not more than 10 percent of the state administrative funds — 15 percent of total state funding — may be reserved for state leadership activities, of which not less than $60,000 or more than $150,000 shall be available for services that prepare individu-

als for nontraditional employment.[12] States must describe how the funds will be used to promote preparation for nontraditional training and employment [Section 122 (c)(17)]. The position of state-level gender equity coordinator is no longer mandated.

Technically, since the definition of special populations changed from Perkins II to III, the elimination of the set-aside in Perkins III refers only to the gender-equity program. The other set-asides in Perkins II did not apply to special populations so defined at the time.

Perkins II also required states to designate or assign state employees who would take responsibility for reviewing state and local plans to ensure that the pertinent provisions under the Individuals with Disabilities Education Act and Title I were being implemented as well as to ensure that the needs of students with limited English proficiency were being met. Perkins III has no comparable requirements.

In Perkins III certain accountability measures remain in place. Assessment of how the needs of special populations and other groups are being addressed and how programs are designed to enable members of special populations to meet state performance levels is a required state leadership activity. Participation in programs providing preparation for nontraditional employment is a core indicator in Perkins III.

The analyses in this section primarily relied on data from state and local interviews as well as some limited information from the national teacher survey.

Impact of Changes in Set-Asides and Assessment

Staffing

Five of seven states reported reductions in state-level staff.

The elimination of the set-asides in Perkins III reduced the number of state-level staff assigned to issues concerning special populations — under the new definition — and the gender-equity program. Five of the seven states reported staff reductions: California, Massachusetts, Michigan, North Carolina and Ohio. These states have eliminated positions or redesigned positions to include other responsibilities.

[12] Nontraditional employment is defined as occupations or fields of work for which individuals from one gender constitute less than 25 percent of those employed in the occupation or field of work [Section 3 (17)].

- California maintained the position of gender-equity coordinator, although it has been reduced from a full-time position to part-time. Massachusetts uses state funds for a staff position that includes gender equity as one of several responsibilities.
- Even before the elimination of the set-aside, Michigan began downsizing by not replacing retirees. What was once a seven-person unit now consists of one part-time gender-equity staffer because of the need to track the related performance indicator.
- North Carolina still has two individuals with statewide responsibility for special populations and gender equity, although these individuals have other responsibilities as well.
- In Ohio, one person was phased out of the gender-equity job and has a new position in the department. Another could have moved to a new position within the department but took a new job elsewhere. Previously the state also employed vocational evaluators — now called career evaluation specialists — who visited districts to provide technical assistance and information concerning career and technical education curriculum and programs. These specialists acted as a resource to schools in the institutional effectiveness process. Lack of funding has reduced the number of individuals in the field who can perform this role.

In some instances, changes in staffing at the state level were not always apparent to the local grantees or did not affect them in ways the state anticipated. In other instances, local grantees also experienced personnel losses. A few experienced gains.

- All the sites in Michigan used Perkins funds to support staffing needs related to serving special populations. More than half of the Perkins funds at Site 1 and most of the district funds at Site 3 were used for this purpose. Even so, Site 2 had to eliminate some paraprofessional positions as a result of funding changes. A fourth site reported taking advantage of the greater flexibility to hire paraprofessionals to improve tutoring and guidance services.

- Overall, local sites in three states reported that staff were eliminated or had their time reduced: Michigan (MI2), Ohio (OH1, OH4), and North Carolina (NC2).[13]

State-Level Perceptions of Impact of Changes

State-level respondents had varying views of the changes in set-asides. Few had data to support or refute their perceptions.

State respondents had different views of the impact of changes. Few had data to support these views.

Some reactions were mostly positive. The elimination of set-asides was perceived as positive because it enhanced states' flexibility, as seen in California and Texas; gender equity was no longer needed in Ohio and Texas; and set-asides failed to institutionalize or promote services and only served to isolate students in California.

We also heard a number of arguments about how programs would suffer: set-asides had failed to institutionalize programs, and without a set-aside, "it's not going to happen" in California and Ohio; equity would be threatened in California and Ohio; and services will be eliminated or become too variable at the local level in Florida.

Fears expressed at the state level were at least partly borne out. In Massachusetts, for example, state officials were worried about the demise of their gender-equity centers and two sites reported some reduction of activities to encourage nontraditional enrollment.

High-level state administrators tended to support elimination of the set-aside in favor of greater flexibility. Program administrators were less sanguine.

Across most states, program administrators who dealt directly with gender equity or nontraditional employment issues were less sanguine than others. These administrators questioned whether gender-equity programs were established firmly enough before Perkins III and worried that the elimination of the set-aside will have a negative effect. However, we were unable to determine to what extent these views reflect the advocacy stance that these individuals are likely to take and to what extent their views are an accurate reflection of the status of gender equity.

Participation and Access

Although this study was not designed to gather systematic quantitative data on participation of students from special populations in

[13] It is likely that staff reductions occurred in other sites as well. Several schools reported that special population staff were located at a district or regional level, and thus local-level respondents might not know about cuts or reallocation of responsibilities.

vocational education programs, the case studies and teacher survey provide some limited information.

First, some states claimed that Perkins III had not greatly influenced participation. Only Texas had data to back up this claim.

- Texas enrollment data in Tech-Prep — which the state feels are its highest-quality programs — indicate that for most special population groups, student representation is proportional to their representation among the total number of students, which in 1998–1999 was 8.7 percent). In that year, 8.6 percent of economically-disadvantaged students, 8.3 percent of academically-disadvantaged, at-risk students, and 7.1 percent of special education students were in the Tech-Prep category. Only among bilingual students was Tech-Prep participation substantially lower than for all other students at 2.9 percent.

Some states offered differentiated requirements for students with disabilities.

Second, several states and localities had vocational programs that were not open to all students or offered differentiated requirements. In some cases these requirements appeared to funnel students from special populations into less rigorous programs.

- Sites in Florida reported that all students, depending on their level of ability, have access to vocational programs. All sites took advantage of a state law that allows school districts to modify basic courses that satisfy graduation requirements for a standard diploma as well as vocational courses of programs of study that lead to a special diploma for Exceptional Student Education pupils. Two sites reported that 40 percent of their Exceptional Student Education pupils were in the Special Diploma program. One site offered a diploma-based program for students at risk of dropping out. Selected students work for half of the day and attend school the other half. Most of the academic work is self-paced and computer-based. Successful students in this program can receive a regular diploma. At another site, however, the required skill level for some programs exceeded that of some special population students.
- North Carolina offers four differentiated diplomas and courses of study. Three of these incorporate both academic and vocational studies — College Tech-Prep, Career Prep and Occupational Prep. The latter is specifically designed for students with disabilities as determined by institutional effectiveness process teams. Occupational Prep students are required to take four credits of vocational electives, not

necessarily in a pathway or at a particular level. The principal at one site especially praised the new pathway, which he said had "given teeth" to the program for special populations. Prior to the development of this course of study, "students could just show up and graduate."

Some programs isolate students from special populations.

Third, in some localities, programs serving students from special populations were isolated from other programs and students. In other localities, students from special populations were mainstreamed into regular vocational classes.

- All California sites indicated that special populations have equal access to all vocational programs, but some programs isolate these students. At one site, for example, many of the programs supporting special education students were not found at the high school but at a continuation school in the district. This continuation school served both pregnant teens and students with "behavioral problems." The latter were being slowly integrated into the regular high school under a new pilot program. Another site's programs for pregnant or parenting teens, however, were at the high school.
- In one Michigan school, special populations had once been targeted for vocational education, but respondents reported that this practice was no longer followed. Nearly all students from special populations — 97 percent — were mainstreamed into regular vocational classes according to ability and encouraged to pursue a regular diploma. This school offered a separate Extended Vocational Alternative for severely handicapped students. Two other sites, however, were less successful in mainstreaming students. One site sent most of the special population students to the technical center. Another expressed concern about the elimination of some traditional vocational classes in an effort to increase the quality of vocational education because it limited the options available to students from special populations, about 22 percent of the student body. In an effort to address this concern, they offered several classes with a lower grade-point average requirement — and a cap at the high end — to allow special population students to enroll.
- A site in Ohio offered different "strands" that allowed students of multiple levels to be served in one classroom. The special education director at this site stated that "the strands are good for kids because they can be part of gen-

eral education classrooms." The area vocational school at this site also reportedly had a higher concentration of special population students.

- Two Texas sites reported mainstreaming students; one also offered some agricultural classes specifically for students from special populations.

Case-study and survey data indicate a widespread perception that students from special population groups are purposely funneled into vocational education.

Fourth, in some states and localities the perception remains that students from special populations were purposely funneled into vocational programs. This perception seemed most acute in states with separate vocational schools, such as Ohio and Massachusetts.

- The technical school in Massachusetts reported having double the number of special population students than the average comprehensive high school in the state — 35–40 percent of students in the school. School staff were concerned that the new state testing system would increase the practice of sending special population students to the school as comprehensive schools were motivated to improve their test scores.

- Ohio was the only state where local sites reported spending Perkins funds to market their programs. According to respondents, the poor reputation of vocational education necessitated active recruitment efforts. Respondents at one site — an area vocational school — felt that the feeder high school targeted special population students for their school; about one-third of the students had individual education plans. Respondents at other AVSs in Ohio also complained about the tendency of home schools to send less academically able students who were not bound for college. The AVSs were also worried that the preponderance of special population or lower-achieving students at their schools would lower their ranking on statewide assessments. This concern also was voiced at the state level.

Finally, teacher survey data suggest a widespread perception that vocational education programs enroll a high proportion of students who are less academically able or who have other problems that negatively affect academic success.

In the survey, teachers were asked to estimate, compared to the school-wide average, whether a particular class had a higher, average or lower proportion of the following types of students: stu-

dents with disabilities, limited English proficient students, pregnant or parenting students, economically-disadvantaged students such as those eligible for free or reduced lunch, gifted and talented students, and at-risk students such as students behind in credits for graduation. Vocational teachers reported having above-average participation for all the above categories of students, except for gifted and talented. Academic teachers reported above-average participation of the latter as seen in Table D.12, Appendix D.

The same pattern was found when the data were analyzed by type of school: gifted and talented students had above-average participation at the comprehensive high schools; all other special categories of students had above average participation at the vocational schools. (All differences were statistically significant; see Table D.13.) These data suggest that students from special population groups are highly represented in courses taught by vocational teachers and in vocational schools. However, we were unable to verify whether these students are over- or under-represented in the high school population at large.

Provision of Services

With the elimination of the set-asides, one might expect some loss of programs and services. By and large, both the state and local respondents reported reduction in services. Very few reported that services were unaffected.

Most sites reported some loss in services to students from special populations as a result of Perkins III changes.

Some states carried out programs or provisions that they hoped would partly offset the elimination of set-asides and help local grantees maintain their programs. In some cases, state efforts seemed to help but in other cases they did not.

Many states reported deterioration of services. Sometimes other funding sources made up for the loss in funds and sites could keep their activities going. Some examples follow.

- Most of the California schools did not perceive any decrease in services stemming from the elimination of the set-asides. One site reported that one program was eliminated, but this program was later reinstated with federal Workforce Investment Act funds. In providing services, two sites reported working closely with local WIA agencies and with their state-funded regional occupational programs.
- None of the Florida sites reported significant changes in services or reduction in programs even though the state-level respondents had voiced concerns that the elimination

of set-asides would lead to reduction in services. One site reported an increase in Perkins funding. Another used other funds to compensate for the loss of the set-aside, and the district retained its gender-equity coordinator. Several sites noted that the broader definition of special populations had doubled the number of students being served, and this often required districts to blend funds from several programs to continue to offer services.

- Three of the Massachusetts sites reduced programs or services. Respondents at the single site that was an exception said their ability to retain services was maintained by the district's hiring of a special population coordinator. This site maintained services for students with behavioral problems, at-risk students, limited English proficiency students and single parents as well as programs to encourage nontraditional employment.
- Two North Carolina sites (NC2, NC3) were hurt by the elimination of set-asides. One reported a significant reduction of services. There were fewer funds for materials and books, and the district coordinator's job changed to a part-time position. The coordinator and the counselors were spending more time on preparing students for state tests. The special population coordinator at this school reported, "We identify the students but don't provide them with services." Conversely, staff at another site said that Perkins funding is not large enough to have an impact on services.
- Three schools in Ohio reported losses in programs or services. One of these was able to fill their funding gaps with money from the district. A representative from that school said that "monies were used differently once the set-asides were eliminated." In another site, however, the School-to-Work coordinator said, "If it's not set aside, it's not going to happen."

Programs geared to preparing students for nontraditional occupations suffered in some states and localities.

Programs geared to preparing students for employment in nontraditional occupations suffered in some states and localities.

- Massachusetts had supported gender-equity centers — it had $2 million to support three centers and 18 programs to serve single parents — and state-level staff believed that services related to gender equity were already declining in both high schools and community colleges as a result of the elimination of the set-aside. Indeed two sites reported losing such programs.

- The California sites claimed that gender-equity efforts were continuing or being developed, but the study found evidence to the contrary. One site, for example, was planning to offer an all-female automotive class. However, this class will not emphasize automotive technology or prepare students for careers in the industry but will cover such topics as emergency car repair, licensing and basic engines.
- In contrast, two Florida sites — one of which had retained its gender-equity coordinator — described some proactive efforts to increase the number of students in nontraditional programs. One had a robotics camp for girls as well as week-long workshops about nontraditional careers. Another had increased enrollment in its electronics academy to more than 50 percent of the class.

In three states, programs for pregnant and parenting teens were continuing.

Programs and services for pregnant or parenting teens fared a little better. These were specifically discussed in sites in Massachusetts, Michigan, Ohio and Texas. The higher incidence of these programs in the Texas sites may stem partly from a state-supported program in Texas — the Parenting Education Program — which state respondents said replaced Perkins funding.

In Michigan, state-level respondents reported that 12 of 13 parent programs were still in operation even though their Perkins funding had been eliminated.

Assessment and Accountability

As discussed previously in the chapter, the ability of states to provide performance-related data for special populations, including information on nontraditional enrollments, is mixed. California, for example, had very little information about the impact of Perkins III on special populations because it did not collect enough data under Perkins II to allow for any kind of comparisons between the programs. Neither does the state have the resources to review, or follow up on, local Perkins plans that detail provision of services.

At least two states expressed the view that the Perkins accountability measures have "taken up some of the slack" in attention to special population issues. Because states and local jurisdictions are required to report on participation in nontraditional programs, the states believe that local jurisdictions have an incentive to provide the needed services. In North Carolina, state officials believed that Perkins III has been instrumental in integrating the concerns about

students from special populations into other programs. They discussed legislation, known as "Closing the Gap", requiring local education agencies to develop annual plans for closing gaps in student achievement based on race, ethnicity, socioeconomic status and gender.

At the local level, very few sites seemed poised to gather the types of data needed. One site in every state reported some ability to meet data requirements, some well and some poorly.

Conclusions

This chapter looked at some specific changes in Perkins III and asked how these changes were affecting implementation of vocational education programs. Our conclusions are limited by the nature of the data we had at our disposal and by the fact that states are beginning implementation. With these limitations, the study points to several conclusions.

First, with respect to funding, we find that states and localities appear to direct funds at Perkins-defined program improvements.

At the local level, Perkins funds seem particularly crucial for supporting technology-related activities — equipment, software, Internet support and the like.

Although the Perkins planning process was intended to direct states and localities to use funds in certain ways, it appears that much room for variation still exists both among and within state systems. Local decisionmaking about resource allocation can rest at the district level and sometimes at the school level. In some states, the districts appear to have a good deal of authority. By and large, most respondents at the local level are not knowledgeable about the sources of funding, so it is difficult to determine the precise contribution of Perkins resources.

Our review of the status of state data systems and activities at the local level, however, suggests that the accountability mechanisms are not yet in place. Most state data systems in this study are incomplete in the sense that they cannot comply with all of Perkins III reporting requirements, although some are more prepared than others. It is simply too soon to tell whether the accountability measures taken in Perkins III will exert greater control over state and local expenditures and efforts than did Perkins II, thereby helping to improve quality.

The changes in Perkins III concerning the elimination of set-asides to fund activities in support of students from special populations appear to have had some negative impact, although the full effects are still unfolding.

The study revealed a complex picture concerning participation and access of students from special populations in vocational education. Florida, North Carolina, Ohio and Michigan have differentiated programs of study or alternative requirements for some students, primarily those with disabilities. In some cases, local respondents indicated that these programs of study have improved services for students from special populations, such as in North Carolina. But we also noted some instances where special population students do not have access to the highest-quality programs, although it is difficult to tell precisely which groups are affected. Other examples indicate that students from special population groups may be isolated from the general student body.

Finally, respondents in the case studies and teacher survey indicated that vocational education programs may enroll a disproportionate share of students from special population groups, but this is a perception we are unable to verify with the data at hand. It is certainly the case that in some quarters vocational education is still perceived as a "dumping ground" for the less academically able.

4. The State Context for Efforts to Improve Vocational Education

The implementation of Perkins provisions and strategies takes place within the broader context of state policy. This chapter examines state policies and addresses the following:

- What are the purposes and philosophy of vocational education from the state's perspective? Have these evolved in keeping with Perkins II and III?
- What general-education reforms are ongoing? How have these affected local practices?
- What are the major state-sponsored efforts to improve vocational education?

While Perkins III embodies the federal vision for vocational education, each state and local education agency has a vision of vocational education that best meets its own educational goals and objectives. These may or may not align with the intentions of Perkins.

A state's strategy for implementing its vision may be greatly affected by its governance structure. This includes the organization of the state agencies that have legislative and administrative authority for education, relationships among key agencies and their level of coordination, the structure of the delivery system from state to local levels, and so on. The governance structure also incorporates important power arrangements, for example whether education policymaking and decisionmaking is centralized at the state level or whether it is allocated to lower levels, such as regions and districts.

In addition, the past decade has seen a surge of state reform efforts devoted to improving the academic proficiency of students. Most states have become part of the "standards-based reform" movement, attempting to improve student achievement through developing content and performance standards for all students, instituting assessments to measure progress toward these standards, and enacting accountability systems tied to student performance. Because these reforms are being implemented in public high schools and include all students in the schools, they have had and will continue to have an impact on vocational education students and programs.

This chapter discusses and summarizes findings in three general areas: changes in philosophy of the states toward vocational education, the structures and authorities the states use to enact their education agendas, and the types of state-sponsored general and vocational education reforms being enacted. It relies primarily on data from the case studies.

Philosophy and Vision

The traditional vision of vocational education emphasized a pathway that led from secondary school to work and was intended to help students prepare for a specific occupation. In this traditional view, the vocational education student was often considered to be less academically talented or more manually skilled than his or her peers.

As discussed in Chapter One, Perkins II advanced a broader and more flexible vision of vocational education. In this vision, vocational education should ensure that students acquire the knowledge and skills needed to meet challenging state academic standards and industry-recognized skill standards, and it should prepare them for postsecondary education and opportunities in "high-skill, high-wage careers."

This study identified several broad themes concerning who is served by vocational education, who supports it and what its purposes are.

States are adopting a broader view of vocational education and some have specific policies.

First, each state's vision for vocational education is consistent with Perkins' philosophy to broaden vocational education in the ways previously discussed. Every state shows some movement in this direction although in some cases it is too soon to tell whether state policies to advance their vision will be effective. In some cases, we saw little evidence that local programs were in line with the state's objectives. For example:

- In 1999, North Carolina reorganized high school programs into four courses of study with differentiated diplomas. Three of these specifically incorporate career and technical education requirements. However, the sites we visited were only just beginning to implement these changes.
- Florida reconfigured its vocational programs into a system of Occupational Completer Points wherein all courses are organized into pathways with sequences of classes identified for specific job exit points. Courses not leading to jobs

do not receive state funding. The local sites in this study, however, seem most concerned about raising academic standards and overcoming vocational education's poor image.

- To encourage a wider range of students to take vocational education classes, Texas required all students to take a technology course to graduate. The state also established eight career and technology areas to focus vocational education more on careers. At the local level, however, only two sites had made any attempts at integration, and little evidence existed that programs were becoming more technological.

Second, while all the states in this study say they support a broad vision of vocational and technical education, it remains an educational alternative that is not for all students. In all states, vocational and technical education course-taking is elective not required. Students can choose to take vocational classes, just as they choose music, drama, art or any number of electives. Program designs that organize courses around a course of study or career theme — such as career academies or career pathways — can create an opportunity for interested students to take a related set of vocational courses, thereby bringing some coherence in their elective studies, but it remains a choice in these sample states.

States still view vocational education as an alternative that is not for all students.

Third, many states and localities struggle to overcome negative perceptions of vocational education. It is still seen by many as the educational alternative for students who will not attend college.

- Recent state reforms in Ohio — for example, the creation of "career pathway specialists" who will develop programs to prepare students for work and college — are in keeping with Ohio's goals to strengthen academic and technical content of vocational education. The state and some sites, however, continue to have problems in communicating changes to the community and attracting a broader student body.
- Texas education officials also have struggled recently to change the general perception of vocational education, and the consensus is that its status has improved in the last five years. However in three of four Texas sites, few changes were evident and vocational education remains a "lesser" alternative to the college prep curriculum.

Some states face objections from parents and employers who are critical of a broader vision of vocational education.

Fourth, the broadening of vocational and technical education in both content and audience is not without its critics in each state of our sample. According to state respondents, many parents view college or university degrees as the main path to success and do not perceive that new vocational or career-oriented programs will lead to college. State respondents also noted some objections from employers, who may have specific needs for entry-level employees with basic technical skills. A broader vision of vocational education can lead to fewer high school courses that prepare students for technically-oriented jobs. Some employers at the local level expressed similar concerns.

Vocational education remains separate from general education.

Fifth, vocational education also remains somewhat separate from general education. As reported in subsequent sections of this chapter, academic reform goals take precedence in state education reform policy. Thus, although the vision for vocational education might be changing, the climate is dominated by concerns about academic achievement.

Overall, the states in this study adopted the spirit of Perkins III and have policies intended to make that vision into a reality. But barriers are evident — for example, the poor image of vocational education, the preference in policy for academic learning and achievement, and the inherent tension between the dual goals of preparing students for education and for work.

The Structures and Delivery Systems for Vocational Education

A major, if unsurprising, finding of the case studies is that the seven states each have a different structure for the delivery of general education and vocational education as shown in Table 4.1.

Table 4.1
Synopsis of State Governance Structure

	California	Florida	Massachusetts	Michigan	North Carolina	Ohio	Texas
GENERAL-EDUCATION STRUCTURE							
Secondary Governance	State Board of Education governs CDE, headed by elected Superintendent of Public Instruction	Under Commissioner of Education, in Department of Education	State Board of Education governs Department of Education	Michigan Department of Career Development administers, State Board of Education oversees policy	State Board of Education oversees Department of Public Instruction	State Board and Office of Superintendent of Public Instruction	Texas Education Agency
Secondary Structure	58 counties divided into 11 geographical regions, 1,000 school districts 72 Regional Occupational Programs/Centers, serving high school and adult students	5 regions within the state aligned with county boundaries with state leads to serve each region; 28 districts and counties are coterminous; within each can be numerous comprehensive high schools and area vocational schools	317 high schools including 26 regional vocational-technical schools	53 secondary regions with 377 secondary agencies, 60 area career and tech ed centers, and 9 trade academies 53 Career Education Planning Districts , which mostly parallel intermediate school district boundaries; in 2001–2002 will reorganize to 25 Career Preparation Planning Areas	State divided into regions with regional service support centers for professional development in each, located at colleges; districts and countries are coterminous; comprehensive high schools only	Career and technical education system has 94 Career Technical Planning Districts; CTE provided in comprehensive high school, Joint Vocational Schools, career centers, CTE compacts	1,221 independent school districts; 1,538 high schools; decentralized to 20 regional education service centers; each region includes several counties and independent school districts
Postsecondary Governance	Separate boards and governance for CC, CSU, UC systems CC under Community College Chancellor's Office	All under Commissioner of Education, with separate board for community colleges and board for university system	Governed by a Board for Higher Education with split for community colleges and four-year colleges	Michigan Department of Career Development, but locally elected governing boards responsible for curriculum, operation, etc.	Separate governance for 3 systems: State Board of Community Colleges; University of North Carolina; North Carolina State University system	Ohio Board of Regents	Texas Higher Education Coordinating Board
Community College Structure	107 community colleges with local boards	28 community colleges serve district/county geographical areas	15 community colleges	28 community colleges, including 1 tribal community college (3 four-year institutions also award AA degrees)	58 community colleges	48 community colleges (26 participate in Perkins funding process)	50 CC districts with 68 CC and 74 campuses

	California	Florida	Massachusetts	Michigan	North Carolina	Ohio	Texas
VOCATIONAL STRUCTURE							
Vocational Education, K–12	Department of Education Standards and High School Development Division; Office of High School Initiatives and Career Technical Education, Office of Academic and Career Integration; Office for ROP/Cs	Department of Education, Division of Educational Programs; Division of Workforce Development; oversees all K-16 vocational education courses	Department of Education, Associate Commissioner for Career and Technical Education	MDCD includes CTE, adult education, and postsecondary, separate from Department of Education	Department of Public Instruction, Director of Instructional Services	Career and Technical Education, part of Center for Curriculum and Assessment, Department of Education	Division of Career and Technology Education
School-to-Work	Called School-to-Career in California; STC governed by an interagency partnership including EDD, CDE, and CC Chancellor's Office; 59 partnerships	STW office found in Department of Education, Division of Workforce Development; provides services through consortia led by CC in each of 28 counties	41 partnerships with regional employment or workforce boards as leads	Moved from MI Jobs Commission (now dissolved) to MDCD	Administered by Department of Education and awarded to districts	Attached to governor's office, separate from Department of Education/CTE	TEA and TCHB participate in STC training management team; 27 partnerships, most at CCs
Tech-Prep	Jointly administered by CDE and CC Chancellor's Office	State promoted through the 28 county CC and related districts	12 consortia; each high school can have an articulation agreement with any CC	30 consortia which align with the 25 regions	Statewide articulation agreements mandated for all CCs and high schools	26 consortia districts jointly administered by ODE and Board of Regents	26 consortia in 763 districts; collaboration between TEA and THECB
ECONOMIC DEVELOPMENT	California Trade and Commerce Agency	WorkforceFlorida.inc with governing board reporting to the governor	Department of Labor	Michigan Economic Development Department, Michigan Works!	Economic Development Board (Department of Commerce, Commission on Workforce), Information Resource Management Commission	Ohio Department of Development; Ohio Department of Job and Family Services	Department of Economic Development
WORKFORCE INVESTMENT ACT STRUCTURE	California Employment Development Department is a state agency for workforce development; interagency agreement between California Health and Human Services, CDE Standards, and HS Development Division, EDD, CCCO	WorkforceFlorida.inc policies are implemented by 24 Agency for Workforce Innovation regional workforce boards	Governed by steering committee including more than 20 members from different agencies 41 regional workforce boards	MDCD administers Job Training Partnership Act/WIA 25 regions, with workforce development boards and associated Educational Advisory Groups	Commission on Workforce Development serves as the Workforce Investment Board delivered through Workforce Boards	Governor's Workforce Policy Board; Superintendent of Public Instruction and Chancellor of Higher Education serve on board; ODE administers Title 2 programs 55 regional workforce boards	Texas Council on Workforce and Economic Competitiveness with TEA, THECB and Texas Workforce Commission Council

First, the states vary by the number of state agencies involved in decisionmaking and delivery of educational services and the relative authority of those agencies. Two states, Florida and North Carolina, have relatively more unified structures with decisionmaking power especially over vocational programs invested in one central agency and delivered or administered by a single or few central agencies in each county. The other states have more fragmented decisionmaking structures with little centralized or unified authority. They also tend to have multiple delivery structures with various local agencies involved in delivery.

Second, the states vary dramatically in the extent to which the state's educational system is centralized versus decentralized concerning decisions between local and state agencies, no matter the number of agencies. Again, two states, Florida and North Carolina, generally held greater relative power over their districts and had resorted to the use of mandated standards, curriculum, assessments and accountability systems for both academic and vocational programs. The other states provided greater power to their local districts or schools and tended toward voluntary standards and assessments, especially in the vocational areas. In Michigan and Texas, for example, the intermediate school districts were often the locus of policy and decisionmaking.

Generally, we found state structures characterized by centralized and unified systems had mandated coherent and uniform vocational programs with clients understanding the system and moving easily from place to place within it. In contrast, the more decentralized systems with more fragmented agency authority and control and overlapping delivery systems often promoted vocational improvement through voluntary means. Florida and Massachusetts provide contrasting examples.

Structures characterized by centralized and consistent decisionmaking and delivery systems have a greater likelihood for coherent and uniform vocational programs with clients understanding the system and moving easily from place to place within it.

Florida. The unified Florida system relies heavily on a county-based delivery system for most vocational functions, and significant power over vocational education at all grade levels is invested in the state-level Workforce Development Division of the Department of Education.

- All educational activities report to and are governed by the commissioner of education, an elected official in Florida. This official oversees the secondary and postsecondary systems, allowing for shared policy on vocational standards and career pathways, for example.
- Vocational education is largely governed from within the K–12 system in the Workforce Development Division. This division oversees all Perkins funding, provides standards for the K–16 system, and is responsible for the administration of Tech-Prep and School-to-Work within the state.
- A single delivery system is used: the county. The K–12 system is based on one district in each county. The community college system aligns with the same counties — one community college in each district and county. The Tech-Prep delivery system also is the same. Each community college is the lead institution for the Tech-Prep consortia in that county. The School-to-Work initiatives used the same delivery system.
- The commissioner of education sits on the Board of WorkforceFlorida.inc, the newly created body in charge of economic development and the Workforce Investment Act. The director of the Workforce Development Division also serves on working committees of this board.

Such a centralized policy and delivery structure has led to a coherent and consistent system of vocational standards, articulation agreements, curriculum and uniform delivery of services, although some variation still exists in implementation in local sites.

The delivery system in Massachusetts has comparatively little uniformity and resembles a patchwork of overlapping initiatives.

Massachusetts. The structure of education in the state of Massachusetts contrasts significantly with that of Florida. The delivery system has comparatively little uniformity. The structure resembles a patchwork of overlapping initiatives or policy areas with their own delivery systems. The state is considerably more decen-

tralized in terms of local power and authority over vocational education programs.

- K–12, community college and higher education systems are separately governed, each with its own state board. This allows for and promotes separate decisionmaking from each component of the system. Respondents revealed a less-than-cordial relationship among these groups in the past but growing cooperation now.
- Within the Department of Education, the associate commissioner of career and technical education oversees K–12 vocational education. This division is treated somewhat separately from the other divisions, the major example being that the state has created mandatory academic standards and assessments but not vocational ones.
- The K–12 delivery system varies dramatically within the state, as does the vocational education K–12 system. The different district structures and vocational school structures do not align with the structure of the community colleges. These colleges do not have formal geographical regions to serve. This K–12 delivery system was not used in the establishment of School-to-Work regions or Tech-Prep regions. Each has its own set of consortia and areas of service that have sprung up as much from local demand and convenience as from any coherent plan.
- While the associate commissioner of education sits on a steering committee heading the Workforce Investment Act initiative in the state, so do representatives from at least 20 other agencies.

Other states appear to fall between these two contrasting cases in terms of centralization and consistency of their structures.

North Carolina's system does not have a structurally strong single line of authority between its different levels of education agencies. But under the leadership of former Governor James B. Hunt Jr., the state legislature set up a unified system of standards, curriculum, courses of study and assessments for K–12 academic and vocational programs and K–16 articulation and dual-enrollment agreements that obtain statewide. It provides for a very unified delivery system, such as Florida's, although also with some variation in implementation.

Ohio has some comparatively centralized structures. It has a single Office of the Superintendent of Public Education for the K–12 levels and an Ohio Board of Regents for the postsecondary level. Career and technical training along with academic training are overseen within the department by the Center for Curriculum and Assessment. The postsecondary and secondary offices and the academic and vocational offices have worked closely to develop Ohio's mandatory academic standards and assessments that include work competencies. The vocational standards are mandatory, but the vocational assessments are voluntary. School-to-Work, Tech-Prep and Workforce Investment Act structures, however, are more fragmented and dispersed across many offices.

California, Michigan and Texas have more decentralized structures similar to those of Massachusetts.

Although California has a single elected superintendent of public instruction, it has an otherwise more fragmented structure for vocational education, compared with Florida or North Carolina. The state has separate governing boards and governance structures for the community college, state university and university systems. Several offices in the Department of Education handle vocational issues, including the Standards and High School Development Division, the Office of High School Initiatives and Career Technical Education, the Office of Academic and Career Integration, and the Office for Regional Occupational Programs/Centers. School-to-Work is governed by an interagency partnership, and Tech-Prep is administered by the Department of Education and the Community College Chancellor's Office. The Employment and Development Department oversees the Workforce Investment Act. The state has voluntary academic and vocational standards. While its academic assessments are mandatory, its vocational assessments are voluntary.

Michigan's vocational structure mirrors Florida's with one agency, the Michigan Department of Career Development, responsible for K–16 vocational education and adult education. In Michigan, however, the MDCD is completely separate from the Department of Education that has responsibility for general education. Furthermore, respondents describe Michigan as a local-control state. The state can "put it out and make a case for it," but cannot mandate testing, use of standards and curriculum, and other activities.

Like Michigan, Texas has a very decentralized delivery structure for general and vocational education, dictated by state law. The Texas state legislature revised the entire Texas Education Code in 1995 to increase local control and support for school district initiatives. As a result, technical assistance functions previously performed by the Texas Education Agency were transferred to the state's 20 regional education services centers. The state, however, did not give away all control. The state holds local agencies accountable to statewide academic standards through a mandatory testing and accountability system.

Implications of these differences in structure and policy instruments will become evident as we further examine vocational education in the schools and districts.

State Reforms

The seven sample states vary in how and to what degree education reforms manifest themselves in their vocational education programs. Table 4.2 summarizes the major reforms impacting vocational education programs in the seven sample states. For each state, the table displays academic and vocational courses separately in three general areas: standards, increased graduation requirements, and assessment and specific vocational reforms. Note that this discussion does not include regular programs that can support vocational education, such as state professional development funds or conferences. Many of these are discussed in Chapter Five.

In sum, the general trend across these states is for reforms to focus on improving academic achievement through standards and for holding teachers and students more accountable through assessments and incentive mechanisms. However, few have implemented similar policies for vocational education. Only three states have clearly put significant effort into standards-based reforms for vocational education: Florida, North Carolina and Ohio.Table 4.2 Synopsis of Secondary Standards and Assessment.

Key: M = mandatory; V = voluntary; BD = being developed; NA = not applicable; Acad = academic; Voc = vocational

	California		Florida		Massachusetts		Michigan		North Carolina		Ohio		Texas	
	Acad	**Voc**	**Acad**	**Voc**	**Acad**	**Voc**	**Acad**	**Voc**	**Acad**	**Voc**	**Acad**	**Voc**	**Acad**	**Voc**
STANDARDS														
Content	V, CA, K–12 academic content standards, math, language arts, science, history-social science	V, BD, Endorsed 10 "core area" standards developed by OVAE; creating crosswalks between acad and voc standards	M, Sunshine State Standards	M, Workforce Development Companion to Sunshine State Standards	M, Common Core of Learning	BD, Certificates of Occupational Proficiency will be mandatory in K–12 and voluntary in 13–16	V by DoE, model content standards in academic areas plus technology	BD by MDCD; V, model content standards for career pathways; employability skills by DoE	M, standard course of study for academic subject areas plus technology	M, vocational blueprints and workforce development standards in standard course of study	M, standards being developed for 6 academic subject areas, plus technology	M, OCAP BD ITAC	M, TEKS for academic areas	V, TEKS for 9 areas offered as guides
Performance	BD	BD	M, grade level expectations for math, language arts, science, and social studies	M in Sunshine State Standards	M, Common Core of Learning	BD Certificates of Occupational Proficiency	V, BD by DoE	V, BD by DoE	M, grade level competencies in course of study	M, in vocational blueprints	None	None	None	V, BD by state skills standards board

IN-CREASED GRADU-ATION REQUIRE-MENTS	Proposal to in-crease math and English require-ments; districts may add addition-al require-ments	None	Increased academic require-ments; required minimum GPA	Must have one credit in career exploratory or fine arts exploratory	No change at state, but some districts adding require-ments	None	No state gradua-tion re-quire-ments except for course in civics	None	New course require-ments associ-ated with COS; district can add course require-ments	Same; key-boarding required by all students.	SB 55 in-creased academics and de-creased electives by two units; awards diplomas with hon-ors	None	Statewide required curriculum sequences	Tech-nology credit may be academic or voca-tional
ASSESS-MENT														
General Testing	M, STAR Program,	V, ACE; career content items for STAR, BD	M, FCAT	None	M, MCAS	None	V, MEAP used for school accredita-tion	None	M, ABC, used for school account-ability	M, Vo-CATS	M, 9th and 11th grade profi-ciency test	M, OCAP	M, TAAS	None
End-of-Course Testing	V, Golden State Exam, selected academic subjects	None	None	None	None	None	None	None	M, in selected academic subjects	M, Vo-CATS required, not used in ac-count-ability	None	None	M, end of course tests in selected areas	None

High School Graduation Exam	M, in 2004, pilot testing with 9th grade students this year	M, vocational education students must pass academic exam	M, competency test in grade 11	M, vocational education students must pass academic exam	M, competency test in grade 10	M, vocational education students must pass academic exam	V, proficiency test in grade 11 but not required for graduation	V, vocational education students must pass academic exam	M, includes skill areas	M, vocational education students must pass academic exams; beginning with class of 2007	M, proficiency test in grade 11	M, vocational education students must pass academic exam	M, passing 10th grade TAAS required, also passing selected end of course TAAS	M, vocational education students must pass academic exam

Standards

All states have adopted academic standards. Only three have mandatory vocational standards.

All states have adopted academic standards for general education. In five states these standards are mandatory — Florida, Massachusetts, North Carolina, Ohio and Texas. In California and Michigan — states that emphasize local control — they are voluntary.

Only three states had mandatory vocational content standards — Florida, North Carolina and Ohio. Florida and North Carolina also have performance standards. Note these states have a more centralized and unified structure for vocational delivery. Some examples follow.

Florida. Florida developed content standards for all academic courses — Sunshine State Standards — as well as content and performance standards for all vocational courses — the Workforce Development Companion to the Sunshine State Standards. Both sets of standards are mandatory.

The discussion about state standards at the local level in Florida was quite mixed even within sites. For example, responses from teachers and administrators at one school ran the gamut from the standards being "reasonable and appropriate" and "cover common-sense material" to being "outdated" and criticized by industry partners.

Several local Florida respondents discussed how they are aligning their curriculum with the state standards — both academic and vocational, according to state law and because the Florida Comprehensive Assessment Test measures the academic standards. Some respondents suggested that aligning with academic standards increases the rigor of vocational classes. Others believed that if vocational education succeeds in meeting the state standards, it will more generally do well. Not everyone, however, was completely supportive of Florida standards. Some were concerned that higher standards may drive out some students who get discouraged, while others feared that standards may lower the profile of vocational education.

Ohio. Early in the 1990s, Ohio began using the Ohio Competency Assessment Profiles, employer-identified

competency lists that outline the knowledge and skills needed to enter and succeed in a given occupational area or an applied academics, dropout prevention, or work and family life program. OCAPs also include tests to assess those competencies.

Changes in the Ohio economy partly led to the development of Integrated Technical and Academic Competencies later in the decade. There are two types of ITAC: generic "core" competencies — such as problem-solving, working responsibly and communicating effectively — and career cluster ITAC that add academic skills for specific career areas — such as arts and communication, business and management, and industrial engineering.[14] During our site visits some commentary arose about the transition from OCAPs to ITAC, with respondents at one site emphasizing that it would require significant curriculum review and upgrades to switch. This school is supporting curriculum-writing sessions to implement ITAC. Teachers at one of the other sites discussed using both ITAC and OCAPs. At another, some teachers used OCAP curriculum but not OCAP assessments. Respondents at two sites supplemented the OCAPs with industry standards to better meet local industry needs. In short, sites were responding in various ways to the Ohio approach.

Of the five states remaining that do not have mandatory course standards for vocational education, Texas has developed voluntary standards, and California, Massachusetts and Michigan are in the process of developing them.

California. California has voluntary academic standards and is developing separate voluntary standards for vocational education. In the meantime, the state has endorsed 10 "core" area standards that were developed by the U.S.

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[14] Core Integrated and Technical Academic Competencies, for example, consist of 51 competencies organized into six strands, similar to the Secretary's Commission on Achieving Necessary Skills framework. Career cluster ITAC for each of the six pathway areas included integrated academic and technical competencies, expectations of desired workforce behaviors, scenarios that show how competencies are applied, and objectives from Ohio's competency-based education standards in grades 9–12 that relate to and reinforce the competencies. Rubrics for assessing career-focused instructional plans are also provided (*From ITAC to Instruction: Resource Guides for Ohio's Career-Focused Education System.* Columbus, OH: Vocational Instructional Materials Laboratory, 2000).

Department of Education's Office of Vocational and Adult Education; these include leadership and teamwork, employability skills, and career development. Several districts or schools mentioned using the state academic content standards or Challenge Standards, an older set of standards. Only one site specifically mentioned state-developed vocational standards. This district was implementing new standards in business education.

Some California sites made efforts to align vocational education curriculum with the state's academic content standards. One district brought together teams of vocational teachers in different subject areas to align the vocational program curricula with core standards. At another site, district funding was used to support curriculum implementation teams to ensure that the district's curriculum reflected state standards.

The perceived impact of California state-level content standards on vocational education was mixed. Staff at one site felt that the state efforts promoted student attainment of challenging academic and vocational standards. At the other extreme, a respondent argued that by placing so much emphasis on academic standards, the state is squeezing out vocational education.

Texas. In a slightly contrasting example, Texas legislation for the Texas Essential Knowledge and Skills included mandatory academic standards and voluntary standards for nine vocational education areas. The vocational standards are not reflected in the assessment and accountability system. At some schools, the vocational TEKS were woven into the curriculum to varying degrees, while another did not incorporate them.

The tone of the comments we heard from local sites in Texas ranged from complaints about TEKS covering too many topics to recognition that the breadth of the standards allows teachers flexibility to do just about anything. Thus, some teachers used the design of TEKS to their advantage while others seemed to ignore them altogether. One teacher who conducts classes in a building and trades program summed it up by saying that the TEKS are somewhat beneficial but overly detailed and cover too many topics. The teacher said, "They look good on paper,

but kids have different interests and may want to specialize." Teachers at other schools said the TEKS "underscore what I already know" and "we mostly use them as a guideline for what we already do."

Respondents held very mixed views about the impact of standards.

In general, respondents across all states held very mixed views about the impact of standards. In Michigan, respondents indicated that the voluntary standards had little impact at all. In Texas and Ohio, local sites generally paid more attention to vocational standards than to academic standards. Schools in Florida and North Carolina gave very mixed reviews of the impact of the mandated standards. Massachusetts schools were generally positive about them. In a few cases, state standards were thought to help increase the rigor of vocational courses. Others worried that the emphasis on academic standards in many states only discouraged some students and further signaled that vocational education was less important.

Increased Graduation Requirements

Several states in the sample — Florida, North Carolina, Ohio and Texas — have increased high school graduation requirements. California has proposed but not yet enacted increased graduation requirements in math and English. For the most part, these new requirements tend to be in academic areas. Two exceptions are North Carolina, which now requires keyboarding courses or the passing of a keyboarding test for graduation, and Texas, which requires a technology credit to graduate. State officials expressed concern that these increased academic requirements might limit the amount of time students have to take elective vocational classes.

North Carolina has a unique system that requires secondary school students to choose one of four courses of study.

North Carolina has created a unique system of graduation requirements that merits further discussion. In 1999, the state reorganized high school programs into four courses of study with differentiated diplomas. Beginning with the class of 2000–2001, all students had to choose one course of study, each with very specified course and graduation requirements:

- College/University Prep readies students to enter a four-year postsecondary institution. No specific career and technical education requirements exist.
- College Tech-Prep is designed for students to transfer to a two-year technical or community college and requires four

credits in CTE within a career pathway, one of which must be a second-level course. The students must also complete mid-level technical or integrated math in addition to Algebra I.

- Career Prep aims to prepare students for immediate employment and requires four credits of CTE in a career pathway or an arts pathway, one of which must be a second-level or advanced class.
- Occupational Prep, which is designed for students with disabilities, requires students to take four credits of vocational electives not necessarily in a pathway or a particular level.

The course of study chosen by the student determines his or her graduation requirements. The reactions to the COS were generally positive and were considered to have raised the status of vocational education. Anecdotally, local respondents indicated that enrollments in the College Tech-Prep COS have increased because students are choosing to be well prepared for both college and job, but the state respondents could not provide clear evidence of this because the program was just being put into place. For the most part, the local districts and schools take the mandated system to mean that their vocational education programs should serve all students and should prepare students for high-skill, high-wage jobs in the local community and region

In contrast, most sites in Texas and Ohio had negative reactions to state-level changes in graduation requirements. As foreshadowed by the state-level respondents, the most frequent cause for concern at the local level was the reduction in vocational class enrollments. State requirements in Texas that might be expected to increase vocational enrollments did not appear to have any significant affect at the local level. In Michigan, however, new district-level requirements to earn nontraditional credits had increased enrollments in business courses, but respondents still had concerns about possible enrollment reductions in other areas.

A few positive reactions to changes in graduation requirements are worth noting. The North Carolina courses of study are viewed as a positive change, assuming students were well counseled in their choices. It was too early to tell what the full impact of this system would be.

In California, the proposed graduation requirements — and changes in college admission requirements — prompted some sites to seek academic credit for some vocational classes. Respondents at two sites, however, thought that increased high school graduation requirements were hurting vocational education because they result in fewer electives open for vocational classes. Staff at the other two sites, the higher-achieving schools, did not mention this problem. At two schools, concerns were expressed that changes in the University of California and California State University entrance requirements would likewise leave less room for electives, including vocational education.

Assessments

Six states have accountability systems with academic tests.

Six of the states, the exception is Michigan, have created accountability systems with high-stakes academic tests — students must pass them to graduate — and schools, teachers and students are somehow held responsible for the test results. All six have recently enacted mandatory graduation exit exams, although not all are in effect as yet

For example, in 1999, California established a high school exit exam to improve the accountability of schools and students in the achievement of rigorous board-adopted content standards, especially in reading, writing and mathematics. Students in the graduating class of 2004 will be the first required to pass the test to receive a high school diploma.

Only two states have mandatory assessments in vocational areas, but these are not part of the accountability system.

Only two states have mandatory assessments in vocational courses, North Carolina and Ohio. In Ohio, these assessments are only required for programs seeking Perkins funds. California has developed some voluntary vocational exams.

> **North Carolina.** North Carolina's Vocational Competency Achievement Tracking System has been introduced to assess student learning in vocational subjects. VoCATS applies to all vocational programs of study and includes a computerized assessment bank of 600 to 800 items per course. Students must pass these end-of-course exams in their vocational subjects.
>
> We found a range of negative and positive comments about North Carolina's testing requirements. Local respondents pointed out that the state had developed new

Blueprints,[15] but that the old curriculum guides had not yet been updated. In the past, teachers could access test questions via the test item databank, but the state has restricted the databank and teachers no longer have access to it. Without access to the questions, teachers cannot identify misalignments between the test and the curriculum and therefore cannot modify the curriculum to address these gaps. The lack of access made some teachers feel "disempowered."

We heard commentary at all of the sites about the alignment between the Blueprints and the VoCATS. Reactions seemed to be fairly evenly divided. Respondents at two sites claimed that the Blueprints are aligned with VoCATS, while those at the remaining sites said that they are not aligned.

Even in North Carolina the vocational tests are not part of the accountability system. ABCs School Report Card is the state's comprehensive plan for accountability. Currently, ABC tests only cover academic courses. Over the next two years, the state is gathering data to consider whether vocational course performance should be included in school-level accountability as well.

State-level respondents in all states were concerned about the emphasis on academic exams.

State-level respondents in all study states were concerned about the overemphasis, from their point of view, on academic exams. They worried that schools would begin to push hard for students to excel at these academic exams, possibly taking time away from vocational learning. None said that the academic exams themselves were a poor policy; rather, most thought that all students would need higher levels of language arts and math skills to succeed as adults than in the past. The academic exams were thought to encourage that. Many, however, expressed a concern over the balance. California respondents, for example, noted that teachers might emphasize preparing students for the state assessments, especially the high school exit exam. While state respondents thought that tests tended to improve the academic learning re-

[15] In the Vocational Competency Achievement Tracking System, each course has a "Blueprint" that shows the integrated skill area — arts, communications, career development, information and computer skills, health and safety, math, science, and social studies — addressed, along with technical competencies and objectives. Review of these Blueprints shows fairly extensive inclusion of academic skill requirements in every WDE course.

quired of students, this might be accomplished at the cost of vocational skill learning.

Local sites' reactions to academic testing regimes were overwhelmingly negative.

By and large, the local sites' reactions to academic testing regimes were overwhelmingly negative, even in states where testing is voluntary. The districts and schools had several types of complaints. Academic testing shifted attention away from vocational education and vocational programs. It reduced the time available for teaching vocational content because teachers had to teach more academics or spend class time on test preparation. In the view of several respondents, academic testing "forced" vocational teachers to align their curriculum with academic standards, while academic teachers did not make similar concessions. Testing increased the need for remedial courses, which in turn threatened enrollment in elective vocational courses. Schools had similar complaints about high-stakes tests, especially in California, where the test is not yet implemented, and in Massachusetts.

In states where vocational assessments were available — North Carolina, Ohio and California — some acknowledged that the tests helped promote integration (North Carolina sites). But outside of North Carolina, the vocational tests were not always used at the sites and respondents voiced similar concerns to those held for academic tests.

Districts and schools in four states — Massachusetts, North Carolina, Ohio and Texas — were concerned enough about testing to devote extra resources to academic and vocational test preparation, such as tutoring, special classes, or diagnostic and remedial software.

Other Vocational Education Reforms

Each of the states had enacted other reforms specific to vocational education, but few of these took on the significance of the standards, assessments and accountability reforms that emphasized academic areas.

> **Florida.** After a major debate several years ago, the goal of vocational education in Florida, for example, emerged as "to provide high-quality education leading to further education and/or a job"; education for its own sake is not a recognized goal. The most significant action taken by the state to advance this goal has been to reconfigure vocational programs into a system of Occupational Completer

Points. All courses have been organized into pathways with sequences of classes identified for specific job exit points. Exit points can occur at secondary school or at the postsecondary level; thus, students can examine specific jobs and see a clearly defined pathway through high school and college. Courses not leading to jobs are not part of the system and do not receive state funding. In this way, Florida has defined vocational pathways that lead to jobs and further education.

California. California's policies emphasize career academies for which the state provides additional funding for programs that qualify and development of career pathways or clusters. California's system also includes regional occupational programs/centers where high school students and adults can receive vocational and technical training. Planning time in career academies is supported with state Partnership Academy funds. Interviews and focus groups with teachers indicated that common planning time was significant for supporting curriculum integration within the academy.

Conclusions

This review of the state context for Perkins implementation shows several interesting commonalities across the states as well as some differences between states.

All the states in this sample have embraced the standards-based reform movement within their borders that emphasizes the importance of academic standards, assessment and accountability. This movement is consonant with federal efforts to promote academic achievement in academic and vocational programs.

The nature of those reforms and the instruments used varied across the states. Three states — Florida, North Carolina and Ohio — are attempting to integrate vocational standards and assessments into their reform packages. Others addressed academic standards first and only now are turning to vocational standards and assessments. Assessments of vocational performance have not been part of the accountability systems set up in any of the sample states. In general, then, we conclude that in this sample, vocational education has been affected by the enactment of academic reforms far more than vocational reforms have been affected or are likely to affect academic programs.

The policy instruments used and the emphasis on vocational education appear to be dependent, at least in part, on the structure of education in those states, the political climate over the past decade, and the extent of changes in the state economy. For example, Florida and North Carolina both had strong centralized state structures, growing economies with new types of jobs being rapidly created, and a succession of governors and political appointees in favor of strong job preparation for the populace. These two states have emphasized vocational education in their standards reforms more than others states, except Ohio, and have had some success in creating integrated academic and vocational standards and assessments.

All the states still treat vocational education as an elective. Even while some states created strong career-based courses of studies or pathways, these remain electives. In general, sites report continuing stakeholder disagreement about the need and place of vocational education in today's high schools, including who will best benefit from it. In this sample, it remained the last resort for many students and not a viable option for the college-bound.

Interviews at the state and local levels indicated some consensus of likely effects of the state reform context, even while the full impact remains to be felt.

- Many respondents thought that the emphasis on academic achievement was important to improving both academic and vocational learning. They saw the state standards, assessments and accountability regimes as important building blocks of improved instruction for all students.
- At the same time, they worried that vocational programs would not be held harmless. Depending on the specific state and local context, respondents reported negative effects on vocational programs and students in the form of reduced vocational enrollments because of pressure to meet higher academic standards and increased course requirements; reduced time on vocational tasks because of increased time on academic requirements and test preparation; and possible reduced quality of instruction, given the emphasis of some tests on simplistic understanding and answers.

While the reforms discussed here are still being fully implemented, all sites could report some impact, some of it possibly

detrimental to vocational programs. We now turn to state and local efforts to implement Perkins quality improvements.

5. State and Local Efforts to Implement Perkins Quality Improvements

Perkins III provides guidance to states to improve the quality of vocational education. As discussed in Chapter One, it outlines several program improvements or elements that will enhance vocational education quality, requires states to address these elements in their state plans, and permits use of Perkins funds to develop them. The elements for program improvement addressed in this study are as follows:

- Promote student attainment of challenging academic, technical and vocational standards.
- Strengthen the academic and vocational and technical skills of students through the integration of academics with vocational and technical education programs.
- Provide students with strong experiences in and understanding of all aspects of the industry.
- Involve parents and employers.
- Provide strong linkages between secondary and postsecondary education.
- Develop, expand and improve the use of technology.
- Provide professional development for teachers, counselors and administrators.

In this chapter, we describe the efforts made by states, local districts and schools to develop and deliver vocational education programs that embody these elements or characteristics. Where applicable, we draw on results from the teacher survey to determine the prevalence of these characteristics nationwide.

In the teacher survey we asked teachers to identify a specific class and report information about it. The class was defined as the first class in the teacher's primary teaching assignment. Teachers wrote in the name of the class, which was later coded as vocational or academic.[16] This is the class referred to in this section as

[16] For the most part, vocational teachers taught vocational classes and academic teachers taught academic classes. The correlation between type of class identified and designation of teacher in the sample as academic or vocational was 0.96.

"identified" or "selected." The survey did not directly ask about Perkins or its implementation, but the questions were designed to gather information about the aforementioned program improvements.

This chapter is organized by the above elements of quality improvement. Under each element we clarify what we sought in interpreting the case-study and survey data. We then provide state-level activities in support of the elements. Finally, we provide local-level information about implementation, including information gathered from the teacher surveys. We use specific examples to highlight some promising practices or some dilemmas or issues faced in the sites. We also try to make comparisons between vocational and academic teachers and between comprehensive high schools and vocational schools. In addition, we noted when local respondents within a state were fairly uniform in their descriptions of activities concerning state policy. A final section presents conclusions.

This chapter examines several questions: What policies and practices do states and localities adopt to improve the quality of vocational education, especially with respect to the quality features embodied in Perkins III? How widespread are these practices? Does vocational education incorporate challenging academic and vocational standards? How does Perkins III contribute to these improvements?

Promote Academic and Technical Skill Attainment

To improve vocational education outcomes, states and localities must ensure that the curriculum and learning activities offered meet high standards. Through Perkins accountability measures, states are responsible for demonstrating that vocational education students attain state-established academic and vocational skill competencies. To accomplish this, states must first establish standards for localities to adopt.

Where states do not develop standards, localities must define their own. For vocational standards, schools can adopt standards defined by industry groups or national initiatives, such as the Secretary's Commission on Achieving Necessary Skills from 1991. Once standards are identified and adopted, states and localities can use them as guideposts for curriculum alignment and development.

In addition to adopting and using standards, schools can take other actions that promote higher levels of skill attainment. For example, they can require academic math classes for vocational students, increase the level of academics within a course so it can receive academic credit, or design courses to achieve industry certification. Schools also can participate in career and technical student organizations that connect vocational education with industry and promote skill attainment through their various activities.

State Efforts

States have encouraged academic attainment through the adoption of standards and assessments that apply to all students.

As discussed in the previous chapter, states have encouraged academic attainment through the adoption of mandatory academic standards — in Florida, Massachusetts, North Carolina, Ohio and Texas — or voluntary ones — California and Michigan — and through the assessment of students relative to those standards. The states in our sample have paid less attention to the development of standards for vocational programs. The two states that have developed mandatory vocational education course standards — Florida and North Carolina — also are relatively more centralized. Ohio also has mandatory standards, but only for programs that seek Perkins funding and state approval. The other four states are either in the process of developing vocational standards — California, Massachusetts and Michigan — or their standards are voluntary — Texas.

States encourage use of industry standards, but only two have mandatory standards for vocational courses.

Five states — California, Florida, Ohio, North Carolina and Texas — reported working on activities to better align vocational courses with the state's academic standards and assessments. Meanwhile all states in the sample report encouraging the use of national or industry certification programs or state licensure requirements as they develop vocational programs and courses, as seen in Table 5.1.

Table 5.1
State Policies to Promote Quality

	California	Florida	Massachusetts	Michigan	North Carolina	Ohio	Texas
INTEGRATION Adoption of Integrated Models	State funded New American High Schools program; California Partnership Academies	State funds SREB and supports voluntary adoption of HSTW and Career Academies (partially supported with STW funds)	State funds SREB and supports adoption of HSTW through modest funding to schools ($2,500 each to 3 schools to act as visitation sites)	Advanced career academy funding from state; Making Connections project incorporates integration	State funds SREB and supports voluntary adoption of HSTW	State supports HSTW through Goals 2000 funds and other state funds	20 HSTW sites; state encourages Tech-Prep consortia to identify and sponsor additional HSTW sites
Integrated Curriculum Development	Cross-walking health and business education with academic standards to develop integrated curriculum	State offers limited number of demonstration grants for schools to develop integrated curriculum units	HSTW intended to whet the appetite of schools to pursue their own development of units; clearinghouse for curriculum developed by teachers	New curriculum development for each pathway; support for MCCTE state curriculum clearinghouse; funding CORD to develop integrated math for auto mechanics; used STW to support some of these integrated curriculum activities	Explicitly promoted in Blueprints; state has developed several courses in business	State developed integrated technical and academic competencies that are cluster-level courses with integrated curriculum	Leadership funds supported state development of units in specific areas; RFA process to fund curriculum development projects
Pathways/ Clusters	Tech-Prep; career majors aligned with 15 industry sectors being developed. Demonstration site in place for each cluster; published implementation guides	All vocational education courses including those at postsecondary level organized into OCPs with technical performance and skill standards	Moving toward organizing offerings into 7 career clusters	Curriculum organized around 6 pathways with 41 career programs; STW funds used to develop pathways	Four courses of study with differentiated diplomas offered to all students; required 9th grade choice and plan; vocational education organized into 11 pathways	6 career pathways developed by state; Tech-Prep	District must offer 3 of 8 coherent sequences of courses; state published "Exploring Career Pathways" to aid choice

	California	Florida	Massachusetts	Michigan	North Carolina	Ohio	Texas
Work-based Learning	Encourages practices connected with Tech-Prep, partnership academies and school to career activities	State established 17 youth apprenticeship programs serving 1,900 students	State supports apprenticeship and internship programs by paying partial salaries of staff to develop programs and make connections; programs must be based on materials and guidelines developed by state STW coordinator	No explicit policy	Promoted through Tech-Prep; state has apprenticeship program, cooperative education program, and internship program; co-op program has detailed policies and procedures	No explicit policy	Tech-Prep programs evaluated on work-based learning opportunities
Generally Increase Academic Content of Vocational Courses	Some courses meet academic requirements for UC/CSU; health science and business crosswalk with STAR; participate in U.S. DOE skill standards projects in health; establish Academic and Career Integration Office			Eliminate keyboarding as CTE class because of low quality	Promoted through Blueprint, which includes academic skills	Eliminate industrial arts, keyboarding, or general courses as CTE because of low quality; ITAC development to link vocational courses with state academic standards	Accomplished through TEKS, incorporated into vocational courses on voluntary basis; sponsoring conferences to increase academic and vocational content in courses

	California	Florida	Massachusetts	Michigan	North Carolina	Ohio	Texas
STANDARDS							
Vocational Course Standards	Being developed by CDE to incorporate 10 core elements	Standards included in the description of occupational completer points	Moving toward certificates of occupational proficiency for the 7 new clusters	All vocational standards are voluntary; career pathway leaders support use of any widely accepted skill standards; health pathway leaders involved in national skill standards project, now used in health programs; out-of-date business curriculum being entirely overhauled; T&I programs in process of restructuring to include SCANS and Goals 2000	Used leadership funds to develop mandatory Blueprint curriculum frameworks for all vocational courses that include standards; leadership funds for development of bank of test items in Vo-CATS end-of-course exams	ITAC for some areas; others being developed	TEKS incorporated into voluntary standards for career and technology areas; some CTE courses receive science credit
Industry Certification	State is pushing for increased use of certification, but this remains voluntary and incomplete	State including certificates for all vocational courses as they are available	State will use in developing the certificate of occupational proficiency	Being included in all 6 career pathways when available; health participated in national standards project	State is pushing for use in all courses and inclusion in Blueprints	Mandated for all automotive programs; being included for other programs as developed	Used at district discretion

	California	Florida	Massachusetts	Michigan	North Carolina	Ohio	Texas
ALL ASPECTS OF INDUSTRY	Reorganizing into 15 industry sectors that create structure for teaching AAI.	No explicit policy	Discussed as part of revisions to business pathway.	No explicit policy	No explicit policy	Require local plans to specify budget activities related to AAI	Curriculum development projects and TEKS framework support AAI
PARENTAL AND EMPLOYER INVOLVEMENT	Promoting partnerships with industry. Will use employer group to develop performance standards	Employers sit on state boards for determining needed improvements and new cluster or program offerings	Employers provide input into program decisions through licensure boards; schools must have site-based councils and business advisory boards	CPS legislation funds Council for Career Preparation Standards, made up of business, education and labor representatives	Employers specifically *not* involved in development of Blueprints	Require local plans to budget activities related to collaboration (links to business and community)	Employer involvement encouraged through Perkins application process; TEKS developed with input from employers and parents
LINKS TO POST SECONDARY							
General	Promoted through school to career; Tech-Prep; Partnership Academy initiative	Promoted through use of OCPs for K–16 system and Tech-Prep; have encouraged links to community colleges STW	Promoted through Tech-Prep program	Through adoption of Tech-Prep and funds for advanced career academies		Through adoption of HSTW (academics at a higher standard) and Tech-Prep (state budgeted additional funds); require local plans to budget collaboration with postsecondary	Promoted through Tech-Prep program; disseminate "Educational Opportunities at Texas Public Schools" (1998) to provide information on postsecondary opportunities statewide
Scholarships		State provides 75 percent funding for any postsecondary for all vocational education students with B average or better (Bright Futures)	State offers limited number of scholarships to University of Massachusetts for high-performing vocational education students	Michigan Merit Award program provides $7,500 to any student scoring well on MEAP or Work Keys			

	California	Florida	Massachusetts	Michigan	North Carolina	Ohio	Texas
Career Exploration		State has funded computer-aided career exploration programs for school adoption			Career exploration courses required in middle schools	Career planning required for all 8th graders	Districts must detail career exploration efforts in Perkins plan to receive funding
Counseling	4-year plan encouraged for all students	State has funded computer aided counseling programs for school adoption		Students complete Educational Development Plan in middle school	EDP to be developed by 9th grade and annually reviewed by student and counselor		Districts must detail counseling efforts in Perkins plan to receive funding
TECHNOLOGY	CDE promotes use of technology with state leadership funds and through professional development		Education technology bond where state supplies matching funds to districts with approved technology plans; sponsors Tech Net Web site for professional development of teachers in technology	Business/IT pathway replaces old business ed curriculum to incorporate IT; Department of Education developing technology content standards and benchmarks	Keyboarding a required course for all students	Creating ITAC curriculum materials in technology	All students required to complete a technology credit; TEKS outlines required technology skills; state leadership funds used for distance learning demonstration projects and professional development of teachers in technology applications

	California	Florida	Massachusetts	Michigan	North Carolina	Ohio	Texas
PROFESSIONAL DEVELOPMENT							
Teacher Certification	Works with CSU system to enhance teacher recruitment and preparation, especially helping teachers use block scheduling to enhance contextual learning; encourages vocational teachers to acquire academic certification to help teach remedial math and English courses; collaborates with California Commission on Teacher Credentialing to ensure standards are reflected in professional development activities	Extra pay for teachers in shortage areas; allows lateral entry, but district must develop own policies	Encourages lateral entry; teachers must show relevant work experience, pass competency tests, and acquire 24 semesters of state-mandated course work	State reports teacher shortage in 14 CTE categories has relaxed management regulations to get retired teachers to return to the classroom	Provides for lateral entry and has supported East Carolina University accelerated licensure program; provides incentives for national board certification	Provides incentives for national board certification; traditional entry through teacher programs requires passing PRAXIS exam; lateral enrollment provides provisional license and requires additional educational course work over several years; certifies qualifying vocational teachers in academic areas so some vocational classes receive academic credit	Using Web-based certification program for rural areas

	California	Florida	Massachusetts	Michigan	North Carolina	Ohio	Texas
Staff Development	Supports professional development through sponsorship of integrated models; sponsors statewide conferences for partnership academies, Tech-Prep; supports California Mentor Teacher Program and beginning teacher support and assessment; uses leadership funds for professional development and technical assistance on standards-based curriculum, articulation, interdisciplinary career paths, and work-based connections; supports committees that identify professional development needs	Supports professional development through sponsorship of HSTW; delivers professional development and technical assistance through regional area directors and area centers for educational enhancement; has Workforce Development Specialist in each center to support standards, HSTW, integrated learning, and other practices	Leadership funds used to support curriculum resources center and summer institutes including yearly conferences on STW, Tech-Prep, HSTW, and Perkins; general state funds supply $125 per FTE to each district for professional development; state requires 15 percent of Perkins local funds be applied to professional development	Sponsorship of career academy model and Making Connections (includes externship); 10 percent of state Perkins funds used for teacher education and professional development; Perkins funds used to support curriculum clearinghouse; sponsors spring/summer updates on progress for teachers, quarterly meeting of CTE administrators; supports one-day orientation for new teachers, two-day workshop on writing, and one-day workshop on writing objectives for each pathway	State sponsors annual summer professional development conference for vocational teachers and externships for teachers; funds professional development on the Vo-CATs; supports professional development through sponsorship of HSTW	Organizes professional development through pathway structure; supports professional development through sponsorship of HSTW	Leadership funds for professional development and development of certification program at universities for teachers, especially in technology applications; sponsoring conferences to increase academic and vocational content in courses; statewide conferences for CTE and academic teachers

However, not all vocational or occupational areas have widely accepted industry standards. In some states, such as Texas, adoption is voluntary; others, such as Ohio, mandate use of industry standards in some programs.

Local Efforts

At the local level, teachers have been affected by the states' move toward academic standards and by the standards movement in general. For example, in the survey most teachers reported that some type of standards existed for their "specified" class: 92.4 percent of academic teachers compared to 82.3 percent of vocational teachers ($p < .001$, see Table D.14). Academic teachers were significantly more likely to report that state and district standards were relevant to their class, while vocational teachers were more cognizant of industry standards. For teachers who reported existence of a standard related to the selected class, most teachers said that standards influenced their teaching to a "moderate" or "great" extent. The differences between academic and vocational teachers were not significant, as seen in Table D.15. Thus, when teachers have identified standards that apply to their class, they report that the standards influence their teaching.

Academic teachers were significantly more likely to report that state and district standards were relevant to their class, while vocational teachers were more cognizant of industry standards.

Respondents at most sites — 25 out of 28 — reported during our field visits that state academic standards had affected the vocational courses. The only sites not reporting this were in Michigan and Ohio, as seen in Table C.3. Respondents at 24 sites reported feeling under pressure to raise the academic content in vocational courses. Twenty-three out of 28 sites reported that the academic testing regime was influential in establishing content in vocational courses — only sites in California and Ohio did not report this. Oftentimes, this was through the inclusion of academic skill practice in vocational courses — for example, inclusion of high-level math or required writing. Fewer sites — 20 out of 28 — reported that state vocational exams influenced the content of vocational courses, in part because of the lack of such exams in several sample states or because of their voluntary nature.

Teachers at most case study schools reported that state academic standards and tests affect vocational courses.

Most sites had moved or were moving toward the inclusion of industry standards in their vocational courses. Respondents at 26 sites in the field sample noted the influence of these standards, while respondents at 16 said one or more vocational courses earn industry certification. This finding was confirmed in the survey analysis. In the survey, vocational teachers were significantly

more likely than academic teachers to report that their class led to a certificate of occupational skills — 37.7 and 4.1 percent for vocational and academic teachers, respectively, as seen in Table D.11.

As indicated in the previous chapter, the increasing influence of academic achievement in vocational courses was seen as both a blessing and a curse. Local respondents were quite positive about the increased emphasis on academics, stating that all students needed greater than basic skills in reading, writing and math to successfully navigate in today's world. On the other hand, some vocational teachers thought the emphasis on academics ate away time that previously had been dedicated to vocational skills. Given the increased emphasis by vocational teachers on industry-based standards, many vocational teachers reported being stretched to meet both academic and vocational standards given that the school day and year had not been increased.

Higher standards have been incorporated in other ways, but these varied between academic and vocational teachers. In the survey, teachers reported on a set of specific features that are indicative of academic or technical quality, as seen in Table D.11. Academic teachers were more than twice as likely as vocational teachers to report that their "identified" class fulfilled an academic requirement — 84 and 42.1 percent, respectively, $p < .001$ — and to report that it was an "honors" class — 24.6 percent and 2.8 percent, respectively, $p < .001$. Vocational teachers were more likely to report that this class had an articulation agreement; was part of a Tech-Prep, pre-apprenticeship or academy program; and included a paid internship or job shadowing. The percentage of vocational teachers' classes fulfilling a graduation requirement — 41.2 percent — is higher than any other reported feature. This suggests that vocational classes are at least aiming to meet some academic standards in addition to incorporating many of the features one expects to be associated with a quality career and technical education.

Similarly, in our site visits, only 13 sites noted that they had one or more vocational courses that met academic standards for college acceptance. Meanwhile 17 noted that some vocational courses did receive college credit — sometimes through dual enrollment — for vocational career paths, as seen in Table C.3. Twenty-two sites reported that vocational classes had articulation agreements, as seen in Table C.5.

A third indicator that teachers promote higher achievement is the amount of homework that teachers assign to students. Surveyed teachers reported the amount of homework — in hours and minutes — assigned to students in the identified class in the last five school days. Academic teachers assigned significantly more homework than vocational teachers — 2.9 and 1.4 hours per week, respectively, see Table D.18. Average hours of homework assigned did not significantly differ for teachers in comprehensive high schools compared to those in vocational schools, as seen in Table D.19.

Academic teachers reported assigning significantly more homework than vocational teachers.

To further explore the differences between the quality of academic and vocational teachers' classes, we developed a "quality index" consisting of some of the individual items just discussed. The index is comprised of six individual scales, and has a maximum value of nine points. The variables used to create the scales measure several characteristics of the selected class: the extent to which state, district, school or industry standards affect instruction; academic quality — fulfills academic requirement, is designated as honors, has an articulation agreement; technical quality — leads to a skills certificate, includes related paid internship; the extent to which certain academic and technical competencies contributed to students' grades in the class; teacher quality — whether a teacher has a certificate in primary teaching area; and amount of homework. (Appendix A describes the derivation of the quality scale in more detail.)

Using scale scores, we examined differences between academic and vocational teachers, as seen in Table D.23. Overall, classes taught by academic teachers score significantly higher than those taught by vocational teachers, although the absolute difference is not that large — 5.08 and 4.62, respectively, of a maximum of nine points. Academic teachers scored significantly higher than vocational teachers on several individual scales: influence of standards, academic quality and homework. Academic teachers were also more likely than vocational teachers to be certified in their primary teaching field, but most teachers were so certified — 97 and 93 percent, respectively. Vocational teachers scored significantly higher than academic teachers on the two remaining individual scales: technical quality and contribution of competencies to students' grades.

This analysis of case-study and survey data leads to the following broad conclusions about efforts to raise standards.

- Academic and vocational teachers are being influenced by standards and assessments to improve the quality of their instruction across all states with little difference among respondents within states.
- These attempts and influences differ somewhat between the two groups.
- Academic teachers report being influenced by the academic standards, but few report being influenced by vocational ones.
- While vocational teachers have attempted to increase the academic content of their courses, they also are guided by industry standards and expectations.

Integration of Academic and Vocational Education

The concept of integration is central to the program improvements in Perkins: indeed, many of the other improvements serve to enhance integration. States are required to describe how they will improve programs by strengthening the integration of academic with vocational and technical components through a coherent sequence of courses.[17] In addition, many other features of integration have been defined that can help promote learning (e.g., Grubb et al., 1992). These fall into two broad categories: structure and curriculum.

By structure we refer to the organization and sequencing of courses or experiences designed to aid the student to develop higher and deeper levels of understanding and career preparation. In addition, it refers to the opportunities provided by the course scheduling for teachers to work together to develop and present a more integrated curriculum.

Schools can align academic and vocational courses either by ensuring that courses taken concurrently are related to one another in content — horizontal alignment, meaning courses taken at the same time — or that courses form a sequence overtime that reinforce each other — vertical alignment, meaning over the four-year high school period. The "coherent sequence" is often translated into a minimum number of vocational classes in order to define a vocational student or program. Ideally, this sequence would also incorporate horizontal or vertical alignment, or both.

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[17] PL 105-332 Sec 134 (b) (3) (A).

Schools can also organize single courses or programs more broadly, for example, by creating career pathways or majors. They can adopt reform models that explicitly support integration, through vertical and horizontal alignment, such as career academies or High Schools That Work .

Schools can group students within pathways, clusters or academies so students focusing in a particular career area take their academic and vocational courses together.

Structural support for teachers to develop integrated curriculum includes team teaching and common planning time for teachers. These provide the opportunities for teachers, especially vocational and academic teachers, to work together to create projects and experiences that seamlessly meld academic and vocational content and skills. Schools can adopt block scheduling to support planning or curriculum integration.

Integration also refers to curricular innovations in which vocational and academic materials are more easily and naturally combined instead of the more traditional separation by course. Schools can adopt strategies to incorporate more academic content into vocational courses, modify academic courses to make them more relevant to vocational studies — such as through adoption of applied academics curriculum or through such integrated curriculum models as High Schools That Work — require projects that force students to integrate learning from different classes, and encourage project-based learning in which students demonstrate application of academic and vocational knowledge, such as designing a product or building a house.

Note that simply increasing academic content in vocational courses does not constitute integration. This simply manifests an attempt to cover academic curriculum. Integration requires the skillful blending of academic and vocational content to help students understand the workings of the world and better learn needed job skills.

Schools also can enhance integration by more directly connecting school learning to work, perhaps in a vertical sequence. This can be accomplished by providing different kinds of learning opportunities that take students to workplaces — such as job shadowing and paid or unpaid work-based learning — and by explicitly connecting school learning and work-based learning — such as in seminars that discuss students' work experiences or in work-

based learning plans. As discussed below, strong connections to employers can enhance the quality of these school-to-work connections.

State Efforts

All state respondents were cognizant of integration concepts and fluent in the language of integration. They also seemed to be highly supportive of the integration approach first discussed in Perkins II. The sample states have adopted several policies, in addition to Tech-Prep, to enhance integration.

Every state in the sample has begun, if not completed, the reorganization of vocational programs into career pathways or clusters to create more coherent and sequential courses of study. These tend to vary by state (see Table 5.1). For example, Michigan has developed six different pathways with 41 career programs while Massachusetts is in the process of developing seven career clusters.

The systems in Florida and North Carolina stand out as providing the most coherent vocational pathway structures.

The systems in Florida and North Carolina stand out as providing the most coherent vocational pathway structures. Florida has done away with stand-alone vocational courses. The state established career pathways or ladders through its Occupational Completer Point system — discussed in Chapter Four — that organizes courses into industry-related clusters. In addition, this system provides coherent sequences of courses — vertical alignment — with specific sequences for each job or completer point — the point of exit from school and entrance into a job — for grades 9–16.

North Carolina's mandated system of four courses of study, also discussed in Chapter Four, incorporates career clusters vertically aligned with a statewide articulation agreement and dual-enrollment policy for all secondary and postsecondary institutions. As in Florida, this was possible because of the strong centralized character of the state educational system. The more recent changes in North Carolina were still being implemented at the time of the visits to local sites.

Most states support reform models that can enhance integration, but schools may or may not choose to adopt them.

Five states — Florida, Massachusetts, North Carolina, Ohio and Texas — have adopted the Southern Regional Education Board's High Schools That Work whole-school reform model. Other states, including California, Florida, North Carolina and Michigan, support the Career Academy model. This model adopts a

school-within-a-school structure that groups teachers and students in a vertically-integrated career cluster; students are grouped to take their academic and vocational courses together. All seven states reported sponsoring curriculum development and dissemination as another approach to getting integrated curriculum into classrooms.

Integration also may be enhanced through work-based learning. Not every state had a set of explicit policies for work-based learning. Florida, Massachusetts and North Carolina emphasized this component more than other states. For example, Massachusetts supports both apprenticeship and internship programs for students. State employees work with employers to develop such programs at the local level and to connect students with work opportunities. The programs are based on materials developed by the state and include specific guidelines for work-based learning activities and experiences.

Local Efforts

Most local case-study sites had vertical alignment of vocational courses and/or a career pathway structure. About half still offer stand-alone vocational courses.

The analyses of school-level data indicate that some forms of integrated structures were more readily adopted than others. For example, while 13 of the 28 sites reported still having vocational stand-alone courses not connected in any sequence, 25 of the 28 reported having some vertical alignment of vocational courses and/or career pathways, as seen in Table C.1.

In Florida and North Carolina, all sites reported using the state-mandated, vertically-aligned sequences of courses and, along with Massachusetts, reported no stand-alone courses. In Florida, site respondents praised the system for making course-taking more coherent and understandable to students. All schools had pamphlets that clearly delineated the sequences and choices of pathways for students. All schools in these two states reported having vertically-aligned curriculum and de facto articulation agreements with local colleges in place stemming from the strong state support for K–16 course sequences. These clear pathways might have enabled the Florida schools to more readily adopt academies. Three of the four schools we visited had created career academies.

In North Carolina, all schools had adopted the state courses of study — although not all were fully implemented — and were beginning to implement the counseling programs that supported the students' choices. Respondents did not see the requirement to choose a course of study as limiting or tracking students: "Stu-

dents will still have lots of choices upon graduation . . . this approach ensures that they are adequately prepared for their choices." However, administrators also noted that it may be difficult for students to change after grade 10 because of prerequisite requirements, course load and scheduling issues.

Ten of the local sites have adopted career academies, while 18 reported having adopted some type of curriculum model that includes vertical integration, such as HSTW or Accelerated Schools.

Sixteen of the schools reported using block scheduling, which allows for longer class periods for project-based work. All the schools in North Carolina reported using block scheduling, in part because the courses of study encourage this approach and promote it through workshops and conferences. Block scheduling allows students to complete the increased requirements included in the courses of study.

Team teaching is rare for both academic and vocational teachers. Teachers have little time for joint planning.

In contrast, the supports needed for teacher-to-teacher interactions and time for developing integrated curriculum were much less evident in the sample sites. Only seven schools in the sample reported any kind of team teaching and this was always among only a handful of teachers in the schools. In the national survey, only 9.4 percent of academic teachers and 12.7 percent of vocational teachers reported jointly teaching a course with a teacher of another subject area during the past year, as seen in Table D.4. Vocational teachers and teachers in vocational schools are slightly more likely to report team teaching than are academic teachers and teachers in comprehensive high schools (Table D.5).

Similarly, only six schools in the case-study sample reported having common planning time between vocational and academic teachers so that they could jointly plan and deliver integrated curriculum. In the survey, teachers reported little opportunity for joint planning, as seen in Tables D.29 and D.30. About 60 percent of academic and vocational teachers reported that the school offers *no* time for planning during the school day — 61.2 and 60.1 percent, respectively, $p < .07$. Teachers in comprehensive schools were a little less likely to report time for joint planning than those in vocational schools — 61.6 and 50.8 percent, respectively.

Although the schools did not provide planning time, teachers collaborated on their own for purposes of developing overall curriculum, discussing student progress, developing assessments, or planning field trips or other activities. More than half of the

teachers surveyed reported some type of collaboration during the current school year, as seen in Table D.29. Academic teachers reported that they are much more likely to work with other academic teachers than with vocational teachers, while vocational teachers seem to collaborate as frequently with both types of teachers. We found similar patterns in the local-level case-study data.

Other forms of curricular integration that appeared to be adopted by many schools in at least some vocational programs included project-based learning (23 sites), better connections to work through opportunities to job shadow or have guest speakers (24 sites), and the opportunity for work-based learning (27 sites, see Table C.2). Few sites, however, adopted senior projects (10 sites) or had school-based enterprises (10 sites).

We note that while respondents at the school level said these types of activities or curricular opportunities existed in their schools, they were neither available to all students nor could respondents report that such practices as project-based learning were uniform across all classes. Here, it is important to distinguish between increasing the academic content of vocational courses and using an integrated curriculum. Many respondents, as noted in the previous chapter, reported using more vocational time to cover academic subjects in preparation for state assessments. We do not consider this in keeping with the notion of integrated curriculum, although it could be considered an attempt to provide more rigorous academic curriculum to all students. Here, we probed for attempts to merge academic and vocational content, often through real-life problem-solving or project-based activities, into a seamless curriculum. This latter idea did not seem to be adopted at many sites.

Probing often revealed that teachers had only one or two integrated curriculum units lasting perhaps a day or so. As examples:

- The agricultural sequence at one school in California — Agriculture Science I and II, Animal Anatomy and Physiology, and Environmental Agriculture Science — incorporated learning of communication skills, laboratory skills, specific scientific knowledge — for example, the metric system — and application of science knowledge in specific areas of agriculture. The teachers mapped the curriculum against the science standards, and the courses received science credit.

- A health teacher and a math teacher in a North Carolina school worked together to develop a three-day or four-day unit during which students would assess their nutritional needs and their actual intake, using basic math concepts to keep accurate track of the student's actual versus ideal intake.
- A school in Florida had been designated a New Millennium school. Teachers were just beginning to get together to develop a more integrated curriculum. Academic and vocational teachers were only just receiving professional development on how to do this.
- A school in North Carolina had sent all the vocational teachers to professional development on integrated curriculum writing, but none of the academic teachers had attended. Each vocational teacher was given an assignment to meet with an academic teacher and develop a unit of integrated curriculum. Because the school had no common planning time, vocational teachers chose whichever academic teacher was available to partner with, even if the pairing made little sense in terms of course content or purpose.
- A Medical Preparation program in Ohio emphasized a "hands-on" approach in the anatomy and physiology course, as well as critical thinking exercises, where students were given a problem situation to think through and solve. The class was organized into teams, and students had to "apply" for the job of head nurse. The teacher "hired" a head for each team, who was responsible for the work of the whole team. Project work was common and students worked in teams for at least half of the daily class time.

Even in Florida and North Carolina, which appeared able to get local sites to adopt the structural components of integration, the study found far fewer examples of curricular integration than one might hope to find. While states have supported integration with conferences; staff development; and, in the case of Massachusetts, Ohio and Michigan, clearinghouses of integrated curricular units, most teachers in our site visits could only describe very limited attempts at a truly integrated curriculum.

Why is integration so difficult? Teachers often reported that lack of funding for professional development, lack of common plan-

ning time or lack of interest posed barriers to the demanding work of curricular integration at the teacher level. In some cases, the separation of academic and vocational programs in different schools — such as area vocational schools and regional occupational programs — worked against integration. Underlying all of this was the increased emphasis on standards-based academic curriculum and assessments and separately developed voluntary (in most cases) standards for vocational skills. The more clearly separate standards had been articulated in the academic or vocational disciplines and the more states had developed mandated curriculum in these subjects, the more teachers reported difficulty in even conceptualizing how to develop integrated curriculum. In other words, lack of jointly developed and integrated curriculum standards put most of the burden of integrated curriculum development on already overworked teachers.

The teacher survey results echo the case studies in showing little evidence of integration. According to teacher reports, student activities most associated with integration are more prevalent in vocational classes than in academic classes.[18] Survey data, as seen in Table D.26, indicated that academic teachers report more frequent use of the type of activities associated with more didactic instruction — listening to a lecture, writing a paragraph, receiving a homework assignment, or taking a test or quiz. Vocational teachers, on the other hand, report significantly more frequent use of hands-on or applied activities (work on extended projects, "applied academics" curriculum, application of academic skills to tasks that might be found in a job or career), technology-related activities (use computers, instruments, tools or equipment; use the Internet to conduct research; use technology in industry or post-secondary setting), career exploration activities, and activities involving distance learning.

Academic and vocational teachers emphasize different kinds of knowledge and skill development in their classes.

Similarly, teachers reported differences when asked to indicate to what extent certain competencies contribute to students' grades in the identified class, as seen in Table D.17. For about a third of academic and vocational teachers, "basic math skills" contribute

[18] We asked teachers to report how often, on average, their students engage in a number of activities in their "identified" class. Response categories included never, one to five times per semester/one to five times per year, one to two times per month/six to 30 times per year, one to two times per week/31 to 80 times per year, and almost daily/81 or more times per year. Table D.16 reports frequencies for never, "occasionally" (one to 30 times per year) and "frequently" (31 times to almost daily).

to students' grades to "a great extent." For all other academic competencies — advanced math, basic and advanced reading, writing skills — academic teachers were significantly more likely than vocational teachers to report that these competencies contributed "a great extent" to students' grades. In contrast, vocational competencies — job specific skills, general employability skills and ability to apply academic concepts to occupation-related tasks — are significantly more important to vocational teachers.

Following the previous National Assessment of Vocational Education (1994b), competencies on the list provided to teachers can be interpreted in the context of the Secretary's Commission on Achieving Necessary Skills. With respect to SCANS-related competencies — teamwork skills, research or reference skills, and ability to use technology to solve problems — teachers do not differ in reporting the contribution of "research/reference skills": vocational teachers are significantly more likely to report that teamwork and technology use contributed to grades to "a great extent." With respect to SCANS-related foundation skills (oral communication, creative thinking and problem-solving), teachers do not differ in reporting the contribution of thinking and problem-solving. Vocational teachers are significantly more likely to report that oral communication skills contribute to grades to "a great extent." Overall, these findings are consistent with what might be expected: academic and vocational teachers continue to emphasize different kinds of knowledge and skill development in their classes.

In summary, state and local efforts appear to have focused heavily on structural components of integration and have successfully implemented some of these components at the local level. In some cases, these changes represent true reform, while in others, they are labels that have been adopted without much alteration to the status quo. Integration of curriculum has proven more fleeting even though states have supported it through professional development, curriculum development and adoption of model programs. Lack of common planning time, lack of block scheduling, different foci of professional development between academic and vocational teachers, and increased mandated standards and curriculum that appear on the surface to discourage integration might all contribute to this state of affairs.

All Aspects of the Industry

Perkins III does not appear to stimulate the adoption of the concept of AAI.

All Aspects of the Industry was first mentioned in Perkins II and called for students to have "strong experience in and an understanding of those aspects of the industry the students are preparing to enter." This means that courses should include such topics as planning, management, finance, technical and production skills, underlying principals of technology, labor issues, community issues, and health, safety, and environmental issues. In practice, AAI is implemented in various ways but is primarily thought of as a way to organize curriculum (e.g., Finch et al., 1999). AAI is present to the extent that these types of topics are incorporated in a program's learning activities.

State and Local Efforts

Interviews with state officials and document review did not uncover many direct policies to encourage an understanding of AAI. This does not necessarily mean it has fallen by the wayside. Rather, AAI appears to be addressed in the context of other policies. However, the term "all aspects" was rarely used at the state or local level, with a few exceptions, such as in Ohio. It appears that Perkins is not stimulating the adoption of this concept in vocational education curriculum to any great extent.

Parent and Employer Involvement

As described in Perkins, a quality vocational program is one that actively engages the identified stakeholders — including students, parents, teachers, employers and community members — in program development, implementation and evaluation. An effective program will include processes to inform stakeholders about the programs, to utilize their skills and interests to improve the program and broaden opportunities for students, and to build on relationships thus developed to promote program goals. Especially crucial is the extensive involvement of labor groups and businesses to provide information about changes in the workplace that affect education programs. The literature suggests that teachers, especially vocational teachers, may play a significant role in connecting with and involving employers (Rosenbaum and Jones, 1995). Parent support also is known to play an important role in student attainment.

State Efforts

Perkins III does not appear to be generating parental involvement in vocational education programs.

The Perkins legislation does not appear to be generating much attention to the issue of parental involvement. Few states have direct policies to involve parents, although this does not mean that parents are not involved.

Queries regarding employer involvement were more fruitful. All states reported having implemented school-level and program-level advisory committees in compliance with Perkins rules and regulations. Another way to involve employers and the community is through career and technical student organizations. A few states reported using state leadership funds to support these organizations.

Local Efforts

Vocational teachers were much more likely to report having contacts with representatives of business, industry or labor groups.

Data from the teacher survey indicate that vocational teachers — and teachers in vocational schools — had significantly greater contacts with representatives of business, industry or labor groups than academic teachers did. More than 40 percent of academic teachers had no contact at all, compared to only 8 percent of vocational teachers, as seen in Table D.8. More than half of vocational teachers worked with employers on advisory committees (57.5 percent), had employers make class presentations (52.1 percent), discussed skill needs with employers (66.8 percent), visited a work site (57.7 percent) and referred students for placement (68.6 percent). Comparable percentages for academic teachers were in the range 12.5 to 39 percent. Similarly, teachers in vocational schools had more contact overall for every type of activity than did teachers in comprehensive schools, as seen in Table D.9.

Even when academic teachers teach career-oriented classes, their classes have more limited contact with employers than do vocational teachers' classes.

This pattern repeated itself among the subset of academic and vocational teachers who taught a vocational or career-oriented class as part of their primary teaching assignment — 98 academic teachers and 827 vocational teachers. Vocational teachers reported significantly greater involvement than academic teachers of vocational or career-oriented classes; the most frequent types of involvement concerned input on skill requirements (28.6 percent), followed by review of overall curriculum (25.8 percent), and advice on the selection of instruments, tools or equipment (20.2 percent, see Table D.21). These findings indicate that academic teachers, even when they are teaching career-oriented classes, have more limited contact with employers than vocational teachers do. Similarly, teachers of career-oriented courses in vocational

schools — primarily vocational teachers — were much more likely to have all types of employer involvement in the identified class than would teachers in comprehensive schools, as seen in Table D.22.

These survey findings are quite consistent with the case studies, where 22 schools reported having industry advisory groups. Specifically, these groups provided insights on curriculum (14 sites) or advised on industry skill needs (17 sites). Local practitioners reported extensive involvement with employers, particularly in Michigan and Ohio, through advisory groups or through the provision of work experiences (20 sites) or hiring of students (21 sites). Respondents at 14 sites reported that businesses had made significant donations of equipment or materials or assisted with funding.

In some states, involvement was either not as widespread or was stronger in some programs than others. For example, in California the career academy programs and regional occupational programs[19] had more connections to employers than other types (see summary, Table C.4).

Connections to Postsecondary

Traditionally, vocational education in secondary schools was primarily geared to preparing students for work right after high school. Increasingly, it aims to prepare students for work and further education, and federal funds support activities that help make that connection. Perkins III directs states to link secondary vocational and technical education and postsecondary vocational and technical education.

Formal connections to postsecondary institutions — primarily community colleges — are usually accomplished through articulation agreements that enable students to receive college credit for high school courses. More informal collaborations may involve local administrators and teachers from both institutions who meet to share information about college requirements or the labor market, develop curriculum for a vocational program or pathway, or

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[19] Regional occupational programs/centers provide vocational training to high school students and to adults in surrounding communities. In many cases, they have strong relationships with the high school vocational programs. Vocational students may take some or all of their courses through the ROP/C.

share laboratory or other equipment.

Another way that secondary schools link to postsecondary education is through guidance and counseling services. In this case the interest is not just college choice and matriculation — the usual function of high school guidance counselors — but career planning. A comprehensive career-planning program might begin prior to high school and include career exploration activities or an introduction to high school programs. High schools typically hold "career and college" nights during which parents and students can learn about postsecondary and career opportunities. Some may hold separate events. High schools may require career planning, regularly updated and involving parents of all students. Schools may offer more in-depth activities, such as special classes for work-readiness, career development or awareness, or a course where students learn about different career pathways before they choose which one to enter. The study investigated the extent and depth of these activities, as well as the availability of specialized or trained staff to conduct career counseling and guidance — for example, school-to-career coordinators, dedicated career counselors or staff development for counselors who engage in career planning.

State Efforts

States use multiple mechanisms to promote connections between secondary vocational programs and postsecondary institutions. By far the most structured means is through Tech-Prep programs and related policies, as discussed further in the next chapter. States have also adopted integrated curriculum models that specify links to postsecondary institutions as a component of the model — for example, career academies. In addition, Florida, Michigan, North Carolina, Ohio and Texas promote links to postsecondary through career counseling, career exploration courses, computer-based counseling programs available to all schools, or scholarships.

Several states in the study mandated or strongly encouraged career planning, sometimes before high school.

Several states mandated or strongly emphasized career planning — California, Florida, North Carolina, Michigan and Ohio — and nearly all sites in these states reported that students developed career plans. Several states have invested in computer software to provide students with the counseling they need. Florida in particular has invested in this manner to support student's understanding of the Occupational Completer Point system and the

vertical pathways available. The software even identifies the postsecondary institutions that offer the pathway of interest. All students are encouraged to use this system to develop their career plans in the eighth grade.

Three states discussed scholarships with students as a way to encourage further education. Massachusetts and Michigan have scholarship programs that any student can apply for and thus they support vocational postsecondary attendance.

Florida's Bright Futures program provides scholarships to vocational students to promote college attendance.

Florida's Bright Futures Program was unique in offering specific scholarships for vocational students. The program is a merit-based scholarship that encourages college attendance. Under the Gold Seal Vocational Scholars Awards, vocational students with a GPA of 3.0 or better and specific minimum test scores can get 75 percent of their tuition and fees paid by the state in any public or private postsecondary institution in Florida.

Before leaving this subject, we need to make a brief observation about the local impact of the Florida's Bright Futures Program. Both state and local respondents reported that this program has had a profound effect on students' and parents' attitudes toward vocational education. The program has made clear that vocational education is valued and can lead to well-paying careers. All school districts and school respondents knew about this program and indicated it sent clear signals to students and parents that vocational education "counted for something." While no one could provide specific evidence, many reported that this program enabled Florida to maintain high vocational program enrollments.

Local Efforts

To assess involvement between secondary schools and postsecondary institutions the survey asked how often — during the current school year — teachers participated in several coordinated activities with faculty or staff from postsecondary institutions. The responses varied significantly by academic and vocational teachers.

Compared with academic teachers, vocational teachers reported more coordination with faculty or staff from postsecondary institutions.

More than half of the academic teachers — 52.3 percent — reported no coordination at all, compared to about one-fourth of vocational teachers — 25.7 percent, as seen in Table D.6. Compared with academic teachers, vocational teachers reported significantly more coordination of any type, for such purposes as curriculum and lesson planning, sharing technology or equip-

ment, discussing student postsecondary preparation, working on articulation agreements and exchanging employer contacts. Except for planning specific lessons or units, all coordination activities occurred significantly more frequently among teachers in vocational schools than teachers in comprehensive high schools (see Table D.7).

Overall, these survey results only partly correspond to the case-study findings. Across the case-study sites, the most common and frequent connections — at 14 of the sites — between high schools and postsecondary schools were found in the development of articulation agreements through which high school courses would receive credit at community colleges or, in a few instances, four-year institutions (see Table C.5).

In a few states — notably Ohio — the local practitioners also reported a variety of connections with postsecondary institutions, including having faculty on advisory boards, sharing information on requirements, and joint curriculum or program planning. The case studies turned up far fewer of these types of activities than suggested by the survey.

The frequency of connections for the purposes of developing articulation agreements found in both survey and case-study data suggests the influence of Tech-Prep. Articulation agreements are a distinguishing feature of Tech-Prep, and, because Tech-Prep is a vocational education reform, one might expect vocational teachers to be more involved in this activity than academic teachers.

Another way that high schools connect with postsecondary institutions is through guidance and counseling and, in particular, career planning. However, according to the teacher survey, almost two-thirds of schools — 64.3 percent — did not require students to develop a career plan, although about 16 percent of schools required written career plans for some students. Planning was more frequent in vocational schools than in comprehensive high schools (see Table D.10).

In contrast to this national picture, career planning was reportedly fairly common in the case-study sites and took different forms. Twenty-two sites reported requiring the students to complete a four-year plan for high school, as seen in Table C.6. Seventeen sites reported regular review of these plans. Nineteen schools reported providing career planning prior to high school — often a career exposure class or seminar in the eighth grade. Twenty sites

reported using career fairs, and 22 reported using career inventories to aid students in their choice of careers and relevant courses.

Across the states, counseling services — including dedicated career counselors — seemed more widespread in "high"-performing schools, whereas "low"-performing schools tended to engage students in a career-planning process through activities embedded in coursework.

Technology

Perkins III emphasizes the more effective use of technology in classrooms to encourage better preparation of students for work and postsecondary education. It specifically encourages teacher training to use state-of-the-art technology, including distance learning, training in academic and technical skills to prepare vocational and technical education students to enter high-technology and communications fields, and program development in high-technology fields. Not mentioned in Perkins, but found in other literature and the National Education Goals is the growing need for all students to become computer-literate. In this report, we focused on identifying policies to support the effective uses of technology in vocational programs, access to and quality of technology — as judged by teachers — teacher preparation, and, to a lesser extent, the uses of technology in instruction.

State Efforts

States have promoted the expansion, development and use of technology, but this does not seem to be a priority area specific to vocational education. Rather, where policies are in place, they tend to apply to all students and programs. For example, several states have technology education guidelines or goals for all students, and these apply to vocational programs.

State policies related to technology often apply to all students and programs, not only to vocational education.

Two states specifically require students to take a technology credit for graduation, North Carolina and Texas. Other states endeavor to include student technology skill acquisition as part of the vocational course standards. For example, these are included in the North Carolina Blueprints. California, Michigan and Texas have specific programs to promote technology skills in teachers.

Local Efforts

At the sample sites, 14 schools had a technology policy and 17 schools had requirements for computer literacy for graduation, as seen in Table C.7. Thirteen sites reported having "high-tech" programs — such as Cisco and pre-engineering — or computer-based courses such as CAD/CAM. Twenty-two sites reported that they emphasize computer-based skills in the curriculum.

The "high-tech" programs visited, however, were of varying quality. A few examples stood out as state-of-the-art — for example, a program in Michigan sponsored by General Motors — but teachers at many sites were not satisfied with the quality or amount of technology available to them.

Three sites in California happened to be "Digital High Schools," providing a glimpse of what could be done to encourage the use of technology. These schools had a schoolwide technology policy applied to all students, not just vocational students and programs. Extra funds were available to these schools to support technology, including funds for staff development for all teachers. This staff development was somewhat general and did not emphasize curriculum integration.

Importantly, districts and schools in the field sample emphasized the criticality of Perkins funding for the acquisition of technology. This was a major source of technology funding for vocational courses at 25 of the 28 sites. At many of these sites, it was the major use of Perkins funds at the local level.

As one California teacher explained, "Teachers are constantly fighting for equipment. Perkins saves our rear end. If it weren't for Perkins, we'd be dead."

Academic teachers were more likely to report problems with technology availability and quality.

A few items on the teacher survey asked about technology-related issues in career-related or vocational classes only. Academic and vocational teachers who taught a career-related or vocational class reported on the availability and quality of technology — including computers, instruments, tools or equipment — in the class. Specifically, they reported on whether or not certain conditions posed a problem for using technology in the classroom. As can be seen in Table D.24, academic teachers were significantly more likely to report a "moderate" or "serious" problem with respect to availability of technology, availability in adequate numbers, appropriateness, alignment of technology with the curriculum and convenience of location. Almost half of academic and vocational

teachers reported problems with having "current or state-of-the-art technology"; about 40 percent of each reported problems with "maintenance of technology." None of these differences were significant for teachers in comprehensive schools compared with those in vocational schools (see Table D.25).

Compared to academic teachers, vocational teachers were significantly more likely to feel prepared to teach the technology-related skills students need to learn in the identified class: 50.1 percent of academic teachers and 81.2 percent of vocational teachers felt "adequately" or "very well prepared," as seen in Table D.20. This difference may stem from the greater non-teaching experience that vocational teachers have in their primary teaching field — compared with academic teachers — or it may indicate that Perkins funds are indeed being directed toward technology-related professional development.

Instruction via distance learning is not widespread

Finally, instruction through distance learning is not widespread. Distance learning was evident in very few of the case-study sites. Two schools in Ohio, for example, used Perkins funds to support online academic course-taking. On the survey, only about 8 percent of academic teachers and 16 percent of vocational teachers reported any classroom instruction involving distance learning in the previous year. Only 2 to 3 percent reported "frequent" instruction through distance learning.

Professional Development and Teacher Supply

Implementation of integration and other program improvements requires well-trained teachers and staff. Perkins III directly addresses this need in asking states to describe how comprehensive professional development — including initial teacher preparation — for vocational and technical, academic, guidance, and administrative personnel will be provided. The programs should, for example, help teachers and personnel assist students in meeting state levels of performance, provide in-service and pre-service training in education programs and techniques, or provide internships that involve business experience for teachers

In addition to professional development, teacher quality can also affect program quality. The vocational teaching force has declined since the early 1980s, but it is not clear if this decline stems from declining vocational education enrollments, a decrease in the supply of teachers or other factors, for example, decline in university programs that train vocational teachers (Guarino, Brewer, and

Hove, 2000). Whatever the cause of the decline, the National Assessment of Vocational Education's interest in vocational teacher quality and potential shortage of high-quality teachers prompted some investigation.

State Efforts

Respondents in most states were concerned about vocational teacher shortages, but their evidence was mainly anecdotal.

Consistent with the legislation, states have developed specific policies to raise teacher quality in vocational schools and classrooms. One set of policies concerns hiring highly qualified vocational teachers into the profession through lateral entry. Florida, Massachusetts, North Carolina and Ohio allow lateral entry with the condition that the vocational teachers take additional coursework in teaching methods during a probationary or provisional period. As far as we could determine, none of the states in the sample required lateral entry teachers to qualify on the exams some of these states require academic teachers to pass. Florida also provides extra pay for teachers in shortage areas but has not put many of the vocational areas on the list.

State respondents noted that lateral entry for vocational education teachers might become more important in the near future. Respondents in most states were concerned about teacher shortages, but none had hard data to support their claims.

The states also promote professional development opportunities for teachers to ensure that existing teachers are proficient in delivering high-quality vocational programs and keep up with the latest developments in the field and to ensure that new teachers quickly come up to speed. Six of the seven states — all but Texas — provided professional development through sponsorship of different integration models, such as High Schools That Work and career academies. Five of the states sponsored statewide conferences in these models or on Tech-Prep, School-to-Work and curriculum integration. Florida, Massachusetts and North Carolina particularly favored this approach.

While most of the states offered specific types of professional development or in-servicing opportunities, Massachusetts took a uniquely decentralized approach. As part of the local planning for Perkins funds, the state requires the local educational agencies to set aside 15 percent of the Perkins funds for professional development. Other state funds provide for $125 per full-time equivalent of professional development funds for each school. Together

these funds have allowed the Massachusetts schools a significant and stable resource for professional development.

Several states also support the use of teacher externships. For example, California, Michigan and North Carolina support these activities. The states have paid little attention, however, to the professional development of school counselors or administrators.

Local Efforts

Nearly half of the local sites reported vocational teacher shortages — these reports were more common in California, Michigan and Ohio. Local respondents in California, Michigan and Florida partly blamed the shortage on the lack of vocational teacher training programs in the state universities.

The field visits revealed that in 20 sites the teachers were cognizant of or had attended professional development activities provided by the state, as seen in Table C.8. Fewer were aware of or participated in professional development supported exclusively by the district or school. In this sample, the most commonly mentioned type of professional development dealt with understanding and using the state's standards and assessments. Only eight schools reported professional development on vocational standards and in about half it involved curriculum integration. Teachers were not always satisfied with the amount and quality of professional development available to them.

The most common topics for professional development were academic standards, subject matter content, and technology. Three-fourths of the teachers reported receiving professional development on these topics.

Consistent with this finding, the majority of teachers surveyed reported receiving professional development on one or more topics during the past 12 months, regardless of the type of school in which they taught or their teaching assignment, academic or vocational. Table D.1 shows the percentage of academic and vocational teachers who reported receiving professional development during the past year on each of 10 topics. The most common topics for professional development were academic standards, subject matter content and technology. Three-fourths or more of teachers received professional development on these topics. The average amount of training in each of these topics among teachers who received training was about 10 hours.

Notable differences also occurred in participation in professional development between academic and vocational teachers. As Table D.1 shows, a higher percentage of vocational teachers than academic teachers report receiving professional development in

vocational education standards, incorporating academic content into vocational subjects, incorporating vocational contents into academic subjects, applying concepts to the real world and incorporating workplace competencies into instruction. Perhaps not surprisingly, all these topics relate to vocational education and integration. Academic teachers were more likely to have received professional development in student assessment than vocational teachers.[20] These findings suggest that vocational teachers indeed receive more technology-related professional development, which may partly account for their feeling more prepared than academic teachers feel. However, the study cannot determine to what extent Perkins III legislation or funding specifically supported these activities.

The survey pointed to some differences in professional development between vocational teachers teaching in comprehensive high schools and those teaching in vocational schools. The professional development experience of vocational teachers in comprehensive high schools more resembles the training received by academic teachers than it does the training received by vocational teachers in vocational schools (see Table D.3).

Finally, teachers at 14 sites had taken advantage of the state programs that offered "teacher externships." Teachers who had attended were universally positive about the experience. Other teachers noted they had opportunities to participate in an externship but were unable to do so because of scheduling conflicts.

Conclusions

The above analytic descriptions indicate that state and local level actors have taken some steps consistent with the federal legislation's view of improvements to vocational education. However, much work remains to be accomplished

The states clearly differed in the consistency of their efforts. In the two states with more centralized control over education, Florida and North Carolina, we found more consistent applications by the school sites of the state policies. In other, more decentralized states, we found more latitude. Even in the two more centralized states, however, important local differences were revealed be-

[20] Similar differences were observed when comparing professional development by school type (see Table D.2).

tween individual schools and districts and their pursuit and use of state and federal resources. Thus, we conclude that, while states have made progress, it remains uneven. Furthermore, the initiative of local actors remains an important ingredient in any improvement effort. The federal government can expect school-by-school variation no matter the state context. However, some states likely will have more consistency in specific areas in local implementation than others.

Perhaps prompted by general education reform, most states have made or intend to make improvements to increase the academic rigor of vocational courses. The case studies provide a number of examples where vocational courses attain academic credit as well as efforts to continue with that trend.

In addition, the teacher survey indicates that a fairly high proportion of vocational teachers teach at least one class that receives academic credit. Many case-study respondents view the Perkins accountability measures to be consistent with state and local efforts to increase academic learning in vocational programs and thereby also supportive of states' own accountability priorities. Although states and localities do focus on academic improvements, similar attention to enhancing vocational education standards lagged in most states. The two exceptions might be Florida and North Carolina, which have mandatory vocational standards, pathways, courses sequences, and, in North Carolina, assessments. Even in these states, accountability regimes favor academics over vocational learning.

States and local districts have made some improvements in implementing some of the structural features that support integration.

However, despite the apparent state support for integrated curriculum and model adoption, school-level adoption and implementation remained problematic at most sites. The case studies provided little evidence of widespread adoption of integrated curriculum.

The survey results suggest that curriculum integration, when it occurred, primarily applied to vocational education. The curricular and instructional practices of academic and vocational teachers remained on separate tracks, and these teachers had different instructional goals for their students.

Neither the case studies nor the teacher survey indicate that schools actively support opportunities for teacher collaboration or planning that might increase curriculum integration. Team teaching and regular joint planning time are rare. Teacher collaboration, when it does occur, most frequently happens within separate academic or vocational disciplines.

All states, districts and schools were adopting strategies to involve employers in vocational programs in various ways, although some local sites were clearly more successful than others. The survey indicates that links to employers are overwhelmingly associated with vocational teachers' classes. Academic teachers have few connections even when they are teaching career-oriented classes. Perkins does not, however, appear to be enhancing linkages to parents in any substantial way.

Efforts to develop, expand and improve the use of technology are evident at many sites, and Perkins funds are essential in these efforts. By and large, teachers at the case-study sites were not satisfied with the technology available to them. Survey data suggest that academic teachers felt significantly less prepared than vocational teachers to teach technology-related skills, and they also reported more problems with respect to availability and quality of technology in their classes.

Connections to postsecondary education also appear to be strong, especially for vocational teachers. The case studies clearly show that vocational teachers interact with community college faculty and staff, primarily for the development of articulation agreements. Similarly, the survey data indicate that such agreements were much more likely to be a feature of vocational teachers' classes than of academic teachers' classes.

Guidance and counseling for purposes of career planning appears to be rare nationwide but was fairly common in the case-study sites. Several states in the sample mandate or highly recommend career planning and most districts and schools we visited comply.

All of the states promote professional development of teachers, but local participation support varied considerably. The survey suggests that academic and vocational teachers' professional development activities cover different topics. Academic teachers receive more professional development on assessment while vocational teachers receive more on integration-related or vocational themes.

The case studies and teacher survey also identify specific barriers to improving vocational education along the lines encouraged by Perkins III. Several seem particularly important. First, all the case-study sites provided examples of the importance of funding to support their efforts at program improvement. Some examples were negative: lack of resources or professional development had hindered their efforts. Others were more positive: federal or state resources had propelled their efforts forward.

Second, the focus on academic standards had enhanced the academic quality of many vocational courses but did little to improve vocational or technical quality. Many respondents from all the case-study sites, including employers, thought that vocational education might be suffering from the uneven emphasis of academics over vocational standards.

Third, many respondents noted that vocational education continues to have a bad reputation among parents, who do not see this course of study as one leading to college. Several respondents cited this as a major barrier to improvement. So long as parents perceived vocational education as a less desirable alternative for their children, it would remain so.

Finally, as mentioned above, teachers are not supported in ways that might enhance integration or other aspects of program improvement. Lack of common planning time and common professional development opportunities maintain the separation between academic and vocational teachers and create difficulties toward developing and implementing integrated curriculum. This separation is exacerbated when academic and vocational programs are delivered in separate schools.

6. Tech-Prep and Other Federal Policies

Thus far our discussion has concentrated on the impact of changes in Perkins III and on state and local efforts to implement the kinds of improvements that policymakers hope will enhance vocational program quality. This last chapter discusses three aspects of federal policy that are also intended to improve or support vocational education: the Tech-Prep Education Act, School-to-Work Opportunities Act and Workforce Investment Act. While Tech-Prep is incorporated into Perkins III as a separate funding title, the others are independent. Each in its own way intersects with the vocational education programs already discussed, and the picture of secondary-school vocational education would not be complete without reference to them.

This chapter employs data from the case studies to examine the characteristics of Tech-Prep and whether states' visions for Tech-Prep are reflected in local practice. The chapter also explores the influence of School-to-Work and the Workforce Investment Act on vocational education.

Tech-Prep and Vocational Education

The Tech-Prep Education Act was introduced as federal policy in Perkins II to respond to widespread concerns that many high school students were failing to develop the technical and academic skills they would need to succeed in the workplace. The goals of the program were to create in high schools a more coherent foundation for further education and employment, to introduce higher standards in academic and vocational courses, and to increase students' motivation to pursue the further education they would likely need for career success, particularly in high-demand, technically-oriented occupations. States were apportioned funds to support local consortia of school districts and postsecondary institutions that are in turn responsible for implementing Tech-Prep. Tech-Prep remained a separate title and funding stream in Perkins III, although its goals certainly overlap with the Perkins goals to improve the quality of vocational education. Some states have chosen to implement the Tech-Prep authority within the larger Perkins III program, but other states operate these as two separate programs. Both approaches are authorized.

This examination of Tech-Prep focused first on how states are defining Tech-Prep programs and students. We then determined whether each state's vision was reflected in Tech-Prep programs at the local secondary school level.[21]

Forms of Tech-Prep

The legislation defined several components that Tech-Prep programs should incorporate: a two-plus-two design — two years in secondary school and two years in postsecondary school — in a non-duplicative sequence of courses; articulation agreements between secondary and postsecondary institutions; a common core of required proficiency in mathematics, science, reading, writing, communications and technologies designed to lead to an associate's degree or a postsecondary certificate in a specific career field; preparatory services, such as recruiting and counseling; and training for teachers and counselors [Section 204].

A recent national evaluation of Tech-Prep (Hershey et al., 1998) identified three main forms of Tech-Prep implementation by local consortia that emphasized and combined these individual elements of Tech-Prep in varying degrees. These forms are useful for illuminating variations in a state's approach to implementing Tech-Prep.

Tech-Prep may be described as a *structured, comprehensive program of study* that includes

- a defined sequence of integrated classes;
- a broadly-defined career focus;
- grouping of students within academic classes;
- an active enrollment and selective application process; and
- courses aligned, rather than articulated, with community college classes — credit is not necessarily awarded.

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[21] A companion report to this study (Hudis, 2002) examines Tech-Prep from the postsecondary side. That report discusses Tech-Prep programs at a sample of 14 postsecondary institutions — two from each of the study states — state dual enrollment policies, and other activities that aim to smooth the transition from secondary to postsecondary schooling. The postsecondary report provides additional details about state Tech-Prep programs, so readers interested in this topic may want to consult that report as well.

Tech-Prep may be an *enhanced vocational program* for students with at least moderate academic success.

- Vocational students are encouraged to take applied academic classes, articulated classes or a defined sequence of classes within a broad career area — there is no clustering.
- Consortia train teachers in applied academic approaches.
- Students do not perceive that they are choosing Tech-Prep programs and would not identify themselves as Tech-Prep students.
- Guidance counselors help students pick appropriate classes — no prescribed sequence of courses.

Tech-Prep may simply *emphasize articulation or applied academics with no target group.* This approach advances one or two ingredients of Tech-Prep but does not really attempt to create a comprehensive program experience.

In the next sections we use these forms to first classify and describe the Tech-Prep programs in the seven states. We then discuss the extent to which local programs follow the state's vision.

Structured Programs: North Carolina and Florida

Of the states in this study, North Carolina's program is the most structured and comprehensive. Florida's program combines elements of a structured program with an emphasis on articulation requirements.

Of the states in this study, North Carolina's program is the most structured and comprehensive.

North Carolina has the most prescriptive and differentiated definition of Tech-Prep as a particular course of study. Interested students must choose College Tech-Prep as one of four courses of study, which includes the core courses and academic requirements for a high school diploma; math, including Algebra I and geometry; a technology course; and locally set student achievement standards. In addition, all Tech-Prep students must take an applied science sequence with other students with the same technical focus. The course of study must explicitly lead to an associate of science degree or two-year certificate. North Carolina also has statewide articulation agreements and uniform dual enrollment between all high schools and community colleges.

Tech-Prep in North Carolina varied widely from site to site on the local level. Although the College Tech-Prep option has been

available since the 2000–2001 school year, it was fully operating at only one site; in others few students enrolled or local articulation agreements were not yet in place. It appeared that the existence of statewide articulation agreements tended to decrease local connections between school districts and community colleges because there was less reason for representatives of these institutions to meet.

Florida defined a Tech-Prep student as one enrolled in an articulated, sequential program of study — enrolled in level 2 or above courses — at grade level or above by grade 11 in mathematics, science and communications, including a technical component, which leads to a minimum of a two-year postsecondary certificate or degree or an apprenticeship program.

Other requirements in Florida included work-based learning and meeting academic standards in math, science, reading, writing and communications. Thus, the program combined elements of a structured program — most notably, the requirement of a defined sequence of vocational and academic classes explicitly linked to community college — with an emphasis on articulation requirements. However, Tech-Prep classes and other vocational education classes have the same standards. The only difference is the articulation agreements.

Florida's statewide vision for Tech-Prep — articulation agreements and a structured sequence of courses — was, for the most part, carried out at the local level.

Florida's statewide vision for Tech-Prep was, for the most part, carried out at the local level. All school-level programs provided guidance to students in choosing sequential classes, had articulation agreements and encouraged students to enroll in postsecondary education. The sites differed somewhat on the specific target group of student for Tech-Prep enrollment and in their application processes.

Enhanced Vocational Programs: Massachusetts, Michigan, Ohio and Texas

For most of the states in the study, Tech-Prep is perhaps best described as an enhanced vocational program.

Tech-Prep in Massachusetts emphasized articulation agreements and student registration.

Tech-Prep in Massachusetts was a hybrid program with elements of all three forms. The state spent five years debating the definition of a Tech-Prep student and finally decided on the following:

> [A student who] has indicated an intent and is enrolled in courses within a recognized Tech-Prep education plan that

> consists of a minimum of two years secondary and two years postsecondary study; is carried out under a written articulation agreement; has completed a Tech-Prep student registration form; allows the student to earn a postsecondary credit while in secondary schools; and leads to a specific postsecondary two-year certificate, degree or apprenticeship program.

The state plan included articulation agreements and student registration and targeted a broad group of students, but it did not define coherent course sequences.

The state's vision was carried out in two of the four schools. A third school offered a more structured program than the state program in clustering Tech-Prep student — regardless of the technical focus of their program — in the same English and math classes. The fourth site — a technical high school — had articulation agreements but no formal Tech-Prep program.

Michigan's Tech-Prep was a fairly open program. A Tech-Prep student must have an Educational Development Plan plus a selection of a series of courses and School-to-Work activities at high school and college levels. Initially, most consortia focused on guidance or work-based learning programs, but eventually the state decided to emphasize articulation agreements or other ways to foster connections between secondary and postsecondary schools. The consortia were in the process of realignment with the state's 25 regional workforce development boards so that Tech-Prep will eventually be connected with the regional planning process that reviews all vocational education programs.

Michigan's program emphasized a career development plan and articulation. Most local sites did not have a defined program.

The state's view of Tech-Prep seemed far removed from local activities. Although all four sites in Michigan had some articulation agreements in their vocational programs, three did not have any program that they called Tech-Prep. A fourth site considered integrated classes to be the defining feature of Tech-Prep.

From the state's perspective, Ohio combined elements of a structured, comprehensive program with elements quite different from those of other states. Rather than encouraging articulation agreements and a "time-shortened model," the state adopted an "advanced skill model." Under this model, high school Tech-Prep classes allowed students to take more advanced courses in college and learn more skills rather than earn college credit and graduate from college early. At the same time, Tech-Prep appeared to be

Ohio's program used an "advance skill model" with Tech-Prep and vocational students in the same classes. Local programs varied substantially from this model.

less flexible than in other states. It required students to continue in the same program of study in postsecondary if they are to remain in Tech-Prep. All Tech-Prep classes must lead to high-tech, high-wage jobs. It was specifically geared to "academically inclined kinds [of students] that *don't* have a career focus." There was no clustering; Tech-Prep and non-Tech-Prep students took the same classes.

The Tech-Prep programs found at the local level varied tremendously, from separate programs with rigorous application procedures — one school described Tech-Prep as "its crowning glory" — to a loose program defined only by a list of recommended classes.

Tech-Prep in Texas included specific guidelines for course articulation, but the sites in this study had few definable programs.

Tech-Prep in Texas was considered at the state level as part of a strategy to encourage successful education transitions and as a higher-quality program than career and technical education (Hudis, 2002). At the time of our study, the characteristics of a Tech-Prep student included the intention to complete a coherent sequence of classes of content high enough to qualify for articulated postsecondary credit.

Other parts of the Texas strategy included a Technical Course Alignment Manual that listed titles and course descriptions for high school courses approved for course credit, usually the final course in a coherent sequence. On the postsecondary side, the Workforce Education Course Manual provided an inventory of workforce education courses offered at community and technical colleges, including course descriptions and student learning outcomes. High school Tech-Prep programs could use these tools to align course content with entry-level community and technical college courses. Texas also was developing a statewide articulation agreement that will be fully implemented in 2002, and was providing training to Tech-Prep teachers, who will ultimately have more specialized training than other teachers.

Little or no Tech-Prep activity occurred at the sites we visited. One had a defined program in criminal justice that attracted mostly low-achieving students who were unlikely to succeed in community college. Two schools had articulation agreements in some classes. There was no particular target group of students, and they did not appear to have to elect to participate.

Loosely Structured Programs: California

California's Tech-Prep program was the least structured of the states we visited. To be considered Tech-Prep, a program must have articulation agreement(s) based on a particular course of study, an integrated curriculum, workplace learning and industry partnership. Unlike regular vocational education, Tech-Prep prepared students for *both* further education and employment, according to the state plan. No statewide articulation agreements existed. Rather, each high school and community college developed its own articulation agreements.

California had the least structured program, and the local sites developed their own articulation agreements.

Two of the California sites had no Tech-Prep programs at all, although both had articulation agreements in some courses. Tech-Prep was considered "outdated" or "stigmatizing," and these schools were not involved with the local consortia. At the other two sites, Tech-Prep amounted to a fairly unstructured program that mostly emphasized articulation agreements.

School-to-Work Opportunities Act

The STW provided funds to states and to local partnerships to develop a comprehensive STW system comprised of three components:

- School-based learning that provides students with the information and skills they need to identify and prepare for promising careers.
- Work-based learning that offers students workplace experiences linked to their school programs.
- Connecting activities that help employers and schools link the school- and work-based components.

Within states, local partnerships consisting of education agencies, postsecondary institutions, labor unions, employers and other organizations were to establish and implement the system.

School-to-Work espoused similar goals to Perkins in promoting the integration of school-based and work-based learning, academic and vocational instruction, and secondary and postsecondary studies. Unlike Perkins, STW emphasized building a system

for *all* students.[22] School-to-work activities were often built on preexisting partnerships and programs, including Tech-Prep, academies, and other career and technical education programs (Hershey et al., 1999). Because the funding provided by the act had ended, this study provided an opportunity to get a sense of STW's legacy in the sample states.

While many schools had activities to facilitate the transition from school to work, our study considered only those activities that were specifically funded by federal STW funds or were begun under the auspices of that program.

Current vocational policy in four states has evolved from their STW programs.

The study found, first, that in four states current vocational education policy has evolved from and was seen as a natural extension of STW. These states identified synergies between the very similar goals of STW and Perkins III and used STW to promote their own goals for vocational education. For example:

- Florida received $57 million in stipends from the federal government to support a number of statewide initiatives, including annual STW conferences, support for career development academies and High Schools That Work, and awards to exemplary programs. Although their grant ended in 2000, the state and some districts were still spending funds. All the schools visited had STW activities, many of which were continuing even without STW funds.
- In Massachusetts, 41 school-business partnerships around the state received STW grants. Three of the four school sites had STW funding at some point. At two sites, STW activities had become institutionalized, for example, the STW coordinator at one is now paid with general district funding. The third site reported that it was "losing ground" on all STW activities but that some were being picked up by WIA funds.
- Michigan used STW funds to develop career pathways, and local programs submitted plans to receive funds. Despite concerns from the federal STW office that the decentralized Michigan system would provide too little oversight to local programs, the funds seem to have been

[22] This aspect of School-to-Work proved somewhat controversial, and, as a result, the Perkins III language specifically stated that federal vocational education funds could not be used for STW programs.

invested wisely. Since the federal funding ended, the career pathways have evolved into a statewide, state-funded Career Preparation System that has replaced STW activities. All the local sites showed some STW-related activity, including some adoption of career pathways.

- In North Carolina, the state's primary goal with regard to STW was to coordinate work-based learning activities for vocational education students. Three local sites had work-based learning activities — primarily job shadowing for teachers and students — funded by STW; and one had work-based programs but did not receive STW funds. Except for one school, these activities seemed fairly institutionalized.

In Ohio, STW was purposely separated from vocational education

According to state respondents in Ohio, the relationship between vocational education and STW has been controversial from the start and little synergy has been created with these two federal programs. The reasons for this seemed largely political.

State officials described STW as a "disaster" and a "missed opportunity." The offices of STW and career and technical education were originally separated on purpose because CTE was seen as inferior, and STW "would not work if connected to CTE." Toward the end of the STW grant, however, an individual with CTE experience was placed in the STW office and the remaining funds were used to support CTE — for example, to develop ITAC and externships. Locally, teachers at one site had participated in externships; two sites had no involvement in STW at all; and the fourth site had participated early but with no lasting influence.

California and Texas were late grantees and had little STW activity.

Two states — California and Texas — had little STW activity. As late as 1997, they were still non-grantee states and had not received federal STW funds.

- California was late in applying for funds and the only site that had a grant was using it to create linkages between elementary and junior high schools.
- Texas officials reported that schools were not very involved with STW, and participation was strictly voluntary. Only one site had funds, which were used to provide career exploration in middle schools and job shadowing for high school and middle school teachers.

Workforce Investment Act

Most WIA activities are geared toward adult education and postsecondary students, therefore most secondary districts and schools reported little involvement with WIA.

The WIA was enacted in 1998 as an attempt to create a more efficient and coordinated workforce development system that also allowed states some flexibility. WIA permitted states to identify a variety of possible roles for secondary and postsecondary institutions but placed more emphasis on postsecondary involvement as traditional providers of training and vocational education or as the location of "One-Stop" centers that will provide an array of services. These institutional roles are still evolving.

As most WIA activities are geared toward adult education and postsecondary students, most secondary school districts and schools reported little involvement with WIA. Florida, Michigan, North Carolina, Ohio and Texas had little or no activity, although a few localities reported some activity.

- For example, two North Carolina sites reported high school participation in the WIA job-training program. One Ohio school had an active WIA youth council with many activities, but these were not coordinated with Perkins-funded activities.

The WIA programs in California and Massachusetts were involving secondary school vocational programs.

Two states in the study — California and Massachusetts — had some WIA activity at the state level that impacted secondary schooling.

In California, the regional occupational programs/centers will receive up to $4.6 million over two years to provide a variety of services to local workforce boards and youth councils. Because secondary school students enroll in ROP/Cs for vocational education, WIA will influence high school programs.

- Two California sites were already affected by WIA. One district had two programs for special education students. At the other, WIA supported an ROP/C summer program that provided work experience to special education students — WIA funds paid their wages. The students continued their schooling at the ROP/C in the following year. The goal of the program was to place them in supported employment by graduation.

The Department of Labor in Massachusetts sponsored STW "connecting activities" and provided $5 million per year through the regional workforce investment boards. A main thrust was to increase participation in work-based learning. The state developed the Massachusetts Work-Based Learning Plan, a standard for

teachers and employers to evaluate students along a set of workplace competencies. Designated staff at the workforce investment boards worked with high schools to promote these plans and trained teachers and employers in their use. The state reported that internships grew eightfold from 1998 to 2001, with an estimated 24,000 students participating in 2001. Two sites reported WIA activities.

- At one site, the local workforce investment board had two dedicated staff to work with teachers, students and employers to use the state work-based learning plans. WIA staff also helped identify student internships and job opportunities and assisted with career fairs. However, few students at the school reportedly took advantage of the WIA services.
- Respondents at Site 3 reported a close, collaborative relationship between district officials and the workforce investment board. The WIB received funds to establish internships in certain industries and to develop a blueprint of critical and emerging industries to guide the school's course offerings.

Conclusions

This chapter examined three federal programs that intersect with vocational education and were intended to support and enhance higher-quality vocational programs.

A highly structured Tech-Prep program at the state level is no guarantee that students will experience a structured Tech-Prep program at their local schools, as local consortia do not always provide the Tech-Prep experience envisioned by the state.

With respect to Tech-Prep, only two states had structured and comprehensive programs. For other states, Tech-Prep was a loose assortment of articulation agreements between high schools and colleges such that high school courses receive college credit. Still other states fell somewhere in the middle — particular Tech-Prep classes or a suggested sequence of integrated classes existed, but they were open to all students and Tech-Prep students were not necessarily identified as such.

The two states that had more-centralized structures and policies — North Carolina and Florida — also had the most-structured Tech-Prep programs at the state level. However, this was no guarantee that students would experience a similarly structured Tech-Prep program at their local schools. While programs at the Florida sites showed some consistency with the state, only one North Carolina site had fully implemented the College Tech-Prep course of study.

Although states may define Tech-Prep in particular ways or have specific goals for the Tech-Prep programs, these perspectives may or may not be visible at the school or district level where local consortia act as fiscal agents and administer the program. The study found few instances of local programs that emulate the state, let alone the federal, vision.

A main characteristic of Tech-Prep that sets it apart from regular vocational programs — at least in federal legislation — is the articulation agreement. The presence of an articulation agreement was the common thread across all the states and local programs, suggesting that this aspect of Tech-Prep is the most salient.

Some states — Michigan, North Carolina and Texas — also had statewide articulation agreements or dual enrollment policies between high schools and community colleges. These policies, however, did not always enhance or support Tech-Prep as defined in Perkins. In North Carolina, for example, these policies actually appeared to decrease links between local schools and districts and the community college sector. Michigan's dual enrollment policies supported articulated course credit, but no other aspect of Tech-Prep.[23]

Of the two other federal reforms related to vocational education, School-to-Work has had a bigger impact when an early effort was undertaken at the state level. Four of the seven states used STW funds to advance certain aspects of their vocational education programs. Respondents at nearly all the local sites in these states reported that programs begun under STW have become institutionalized and continue with local and/or state funding.

The Workforce Investment Act, on the other hand, has had minimal effect at the secondary level in most states or local districts and schools. This is not very surprising because WIA is geared toward adult and postsecondary education.[24] As WIA is implemented, however, other states also might use it to promote secondary school programs. It is just too soon to tell.

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[23] For further discussion of the impact of dual enrollment policies, see Hudis (2002).

[24] See Hudis (2002) for discussion of the impact of WIA on postsecondary institutions in this study.

7. Conclusions and Implications

The purposes of this report on vocational education in secondary schools were to provide evidence on the extent to which actual practice is consistent with federal legislation and other views of what constitutes "quality" practice and how policies made at different levels of the education system enhance or impede the implementation of quality practice. The report did not attempt to answer all the questions of interest to Congress or the National Assessment of Vocational Education. Rather, it investigated a subset of questions concerning the implementation of specific program improvements in Perkins III and other practices that aim to improve the quality of vocational education.

In this chapter, we summarize the findings discussed in the previous chapters to provide answers to the five broad questions addressed in this study. We then discuss the policy implications of the study's findings.

1. **What are the purposes and philosophies of vocational education at the secondary level? Have these evolved in keeping with Perkins legislation?**

Many states and localities have adopted the spirit of the Perkins philosophy to broaden the content of and participation in vocational education, and some have specific policies to advance it.

Several of the states in the sample had adopted new "mission statements" concerning vocational education and had changed the names of agencies that support vocational education. These changes tended to promote vocational education as a program of study that can lead to both higher education — at least to the community college level — as well as preparation for careers or immediate jobs. This shift from a more traditional view of vocational education as only preparation for work in a particular occupation immediately after high school is in keeping with Perkins. Both states and localities, however, faced challenges in promoting this vision.

While respondents from all the states in this study said they support the broader vision of vocational and technical education, it remains an educational alternative that is not for all students. All the states still treat vocational education as an elective, even those states that created career-based courses of studies or pathways.

In general, the case-study sites reported continuing stakeholder disagreement about the need for and place of vocational education in today's high schools, including who will best benefit from it. The prevailing perception is that vocational education is the program of study for less academically able students. Data from the teacher survey, as reported in Chapter Three, indicate that vocational teachers share this perception; they report that their classes have higher proportions of students from special populations, compared with other classes in their school.

A related perception is that vocational education in secondary school will not lead to college. Case-study data indicate that parents, students and some educators view a college diploma as the only ticket to future success — a perception that finds support in research (for example, Boesel and Fredland, 1999; Murnane, Willett, and Levy, 1995; Murnane and Levy, 1996).

The Perkins legislation may even contribute to the problem by continuing to define vocational and technical education as education for work requiring less than a baccalaureate degree. While the language in Perkins encourages connections to postsecondary education through Tech-Prep or other activities, this connection rarely extends to four-year institutions.

By and large, this study found that vocational education remains separate from academic or general education, as it has for many decades. The many efforts discussed in the report to broaden the content of vocational education and its appeal to students and parents have not overcome this isolation and perception.

2. What other education reforms are ongoing and how have they affected vocational and technical offerings within states and localities? What is the influence of federal and state policies at the local level?

As described in Chapter Four, all the states in this study have embraced reforms that emphasize the importance of academic standards, assessment of academic performance and accountability. These types of reforms are consistent with the standards-based reform movement across the nation and with federal legislation that promotes academic achievement in academic and vocational programs.

Only three states had significant reforms to address vocational standards and assessments, but these were not part of the states' accountability systems, which address academic learning only.

Four states increased high school graduation requirements, but these concern primarily academic subjects. These requirements have prompted some schools to upgrade the academic content of vocational courses to receive academic credit.

Interviews at the state and local levels indicated some consensus on effects of the state reforms, although the full impact of some of these reforms has yet to be felt. First, local respondents generally reported that the emphasis on academic achievement was important to improving both academic and vocational learning. At the same time, however, they worried that vocational programs would not be held harmless. Second, depending on the particular state and local context, respondents reported negative effects on vocational programs and students in the form of reduced vocational enrollments because of pressure to meet higher academic standards and increased course requirements; reduced time on vocational tasks stemming from increased time on academic requirements and test preparation; and possible reduced quality of instruction given the emphasis of some tests on simplistic understanding and answers. Third, state academic reforms and accountability systems dominated educators' concerns.

3. **What are the state and local efforts to improve the quality of vocational education, especially with respect to the key quality attributes outlined in Perkins III?**

The study found that state- and local-level actors have taken some steps consistent with the federal legislation's view of improvements to vocational education. However, much work remains to be accomplished.

The case-study sites clearly differed in the consistency and depth of their efforts to implement the program improvements — a finding that has been documented in previous studies (McDonnell and Grubb, 1991). This stemmed from many factors, including the structure of the education system, as discussed in Chapter Four, and the capacity and will of state and local actors. In this nation's decentralized education system, variation among states and schools is to be expected.

As discussed in Chapter Three, states and local education agencies followed the legislation in directing Perkins funds toward the kind of program improvements outlined in the law. That said, they also showed different priorities in funding. The most consistent use of Perkins funds at the local level was to support technology-related expenditures. Many local respondents noted that

Perkins funds were crucial in maintaining this aspect of their programs. It is also important to point out that states and LEAs have other funding sources to direct at program improvements, and this report could not isolate the precise influence of Perkins funds. Other NAVE studies that examined funding in more detail might shed more light on this report's initial observation.

Chapter Five described state and local efforts to implement Perkins program improvements. First, the study found that Perkins provided little stimulus for improvements in two areas — promoting understanding of "all aspects of the industry" and encouraging parental involvement in vocational education. Perkins also appeared to influence professional development for vocational teachers — at least at the state level — but not for administrators or counselors.

Overall, the most significant efforts were directed at integration, raising the academic rigor of vocational courses and programs, building linkages to employers and postsecondary education, and implementing technology-related improvements. The following sections summarize the main findings.

Integration

Efforts to improve quality through the integration of academic and vocational education primarily emphasized new structural arrangements. In particular, the case-study data indicate that all states, districts and schools in the sample have made progress toward developing coherent sequences of courses in vertically-aligned clusters or pathways. Three examples are Florida's Occupational Completer Point system, North Carolina's courses of study and California's state-funded career academies program. The reform in North Carolina is particularly noteworthy for clearly delineating different levels and aims for the three courses of study that involve career and technical education. The impacts of these changes in the longer term are uncertain.

States also support the development of integrated curriculum and adoption of reform models that incorporate integration, for example, High Schools That Work. At the school level, however, adoption of structural and curricular reforms remained inconsistent at most sites. The case studies provide little evidence of widespread adoption of integrated curriculum within a school. Each site could point to one or two vocational programs that appeared to reflect the spirit of curriculum integration — for example, by in-

cluding senior projects, project-based learning or opportunities to apply academic knowledge to vocational or work-related problems. By and large, programs seemed more successful at making connections to work through work-based learning or job-shadowing opportunities.

The survey results suggest that curriculum integration, when it occurs, primarily applies to vocational education. According to their own reports, the curricular and instructional practices of academic and vocational teachers remain significantly different. Academic teachers' instructional practices are more didactic and more focused on developing students' academic competencies. In contrast, vocational teachers' instructional practices are more applied, or "hands on"; involve greater use of computers and other tools; and make more specific reference to careers. Vocational teachers also place more emphasis than academic teachers do on developing students' technical knowledge and skills and work-related skills and competencies.

Finally, the case studies and the teacher survey indicate that schools provide insufficient opportunities for teacher collaboration or planning — activities known to enhance integration (Benson, 1997; Ramsey et al., 1995). Team teaching and regular joint planning time is exceedingly rare. Teacher collaboration, when it does occur, most frequently occurs within academic or vocational disciplines, not between them.

Use of Challenging Standards

As discussed in Chapter Four, the states in this study were implementing general education reforms aimed at academic learning. Vocational education seems to be going along with this tide in the sense that it is being held accountable in many states for contributing to higher student achievement. The number and kinds of specific activities directed toward increasing the academic rigor of vocational courses is testimony to this effort. In addition, teacher survey data indicate that a fair proportion of vocational teachers reportedly teach at least one class that receives academic credit.

Many case-study respondents view the Perkins accountability measures as consistent with state and local efforts to increase academic learning in vocational programs and thereby are supportive of states' accountability priorities. Similar effort was not directed toward improving vocational standards. The exceptions are Flor-

ida and North Carolina, which have mandatory vocational standards, pathways, courses sequences, and, in North Carolina, assessments. Even in these states, accountability regimes take no notice of achievement in vocational and technical subjects.

All states are moving toward at least voluntary adoption of vocational standards, and many local sites seem anxious to implement these standards if they do not have them already. All states and most districts and schools were adopting industry standards as available and appropriate. The survey data indicate that when teachers have identified standards that are appropriate to their classes, they report being influenced by them. Not surprisingly, vocational teachers are more attuned to and influenced by industry standards than are academic teachers.

Build Links to Employers and Postsecondary Education

All states, districts and schools in the sample were adopting a variety of strategies to involve employers in vocational programs, although some local sites were clearly more successful than others. The teacher survey supports the conclusion that vocational teachers have significantly more connections with employers. Academic teachers report few connections even when they are teaching career-oriented classes.

Vocational teachers in the survey and case studies also report stronger connections to postsecondary education than academic teachers do. A primary reason for linking to postsecondary institutions is to establish articulation agreements — Perkins appears to have applied a direct hand here, through Tech-Prep. Many states and local sites also support links to postsecondary education through career planning, although this activity appears to be less prevalent nationwide than it was in the study sample.

Develop, Expand and Improve the Use of Technology

One of the areas in which Perkins appears to have had some impact is in efforts to develop, expand and improve the use of technology. Several findings point to this conclusion. As discussed earlier, nearly all of the local sites relied on Perkins funds for technology-related purposes: respondents reported that they would be far worse off without Perkins funds. Even so, most teachers in the cases studies were not satisfied with the availability or quality of technology. Second, in the survey data, academic teachers report more problems with technology and feel less pre-

pared than vocational teachers to teach technology-related skills in classes where such instruction is relevant. Third, the case studies noted a definite trend to create more high-tech programs that will better prepare students for technology-heavy fields, although many more of these programs are desirable. Fourth, in the survey data, vocational teachers were significantly more likely than academic teachers to report incorporating instructional activities in their classes that used computers and other tools. Fifth, several states and schools promote technology skill development or computer literacy for all students. Although Perkins funds are not necessarily involved here, these types of requirements and supporting activities, such as teacher staff development, also benefit vocational teachers, students and programs.

Distance learning is one area that Perkins has not stimulated much activity. The study found few examples of instruction through distance learning in vocational education courses or programs.

4. **What is the impact of changes in Perkins III on special populations and other groups and the programs that serve them? Have changes at the state level affected service delivery at the local level?**

The changes in Perkins III concerning the elimination of set-asides to fund activities in support of students from certain groups appear to have resulted in reduced staffing for these specific purposes in five states and some localities. Gender-equity programs were most seriously affected. Although some respondents seemed pleased with the flexibility afforded in Perkins III, most reported negative effects.

Apart from the impact of the elimination of set-asides, the study revealed a complex picture concerning participation and access of students from special populations in vocational education. Four states have differentiated programs of study or alternative requirements for some students, primarily those with disabilities. In some cases, local respondents indicated that these programs have improved services for students from special populations — for example, North Carolina. In other instances these students did not have access to the highest quality programs or were isolated from the regular student body, although it is difficult to tell precisely which groups were affected.

Finally, respondents in the case studies and teacher survey indicated that vocational education programs might enroll a dispro-

portionate share of students from special population groups, but this is a perception that the study is unable to verify. This finding does, however, confirm results from many prior studies (McDonnell and Grubb, 1991).

5. **What are the characteristics of Tech-Prep programs? Are the states' visions for Tech-Prep reflected in local practice?**

Tech-Prep takes various forms in the states visited. Tech-Prep at the local level does not always reflect the state's vision.

Only two states had structured and comprehensive programs, but these were not always realized at local sites. For other states, Tech-Prep does not exist at all or, if it does, only as a loose assortment of articulation agreements between high schools and colleges such that high school courses receive college credit. Still other states fall somewhere in the middle — there are particular Tech-Prep classes or a suggested sequence of integrated classes, but they are open to all students and Tech-Prep students are not necessarily identified as such.

Although states might define Tech-Prep in particular ways or have specific goals for the Tech-Prep programs, these perspectives were not always visible at the school or district level where local consortia act as fiscal agents and administer the program. The study identified few instances of local programs that emulate the state, let alone the federal, vision.

State policies for dual enrollment or statewide articulation agreements do not necessarily enhance or support Tech-Prep as defined in Perkins.

There may be may be several reasons Tech-Prep is less effective than hoped. First, as with the rest of the Perkins Act, federal direction was limited. The legislation included a number of general requirements but did not specify the relative importance of the different elements or how they might be configured. Rather, it left states and localities to work out the details. As a result, Tech-Prep programs in this study were highly varied in their activities and student populations — a finding that concurs with previous studies (Hershey et al., 1998; Bragg, 2001). A second reason may be the association between Tech-Prep and vocational education. In several of the study sites, the poor reputation of vocational education did not help attract students and it sometimes created difficulties in creating connections with postsecondary institutions as

well. A final reason we have already discussed: states are focused on academic achievement. Although a Tech-Prep program designed as the legislation intended is arguably one specific strategy that could help raise academic achievement, it would only apply to some students. States have other policy options, such as increased graduation requirements or mandated testing, that can apply to all students and over which they have more control.

General Conclusions and Policy Implications

We set the tone for the report in Chapter One by reviewing the change in language between Perkins II and Perkins III and noting the stronger incentives provided in Perkins III for compliance with federal intent, and by providing a set of expectations with regard to state and local compliance or implementation distilled from a general literature on implementation of past federal education policy. We indicated that, given the evidence provided by the literature, one might expect to find significant variation from state to state and among localities within states in the adoption of the quality practices defined in the federal legislation for three reasons: insufficient time has passed since Perkins III enactment; other state-level reforms may interfere with Perkins implementation; and Perkins provides relatively weak incentives compared to other reforms.

Given this introduction and the evidence described in the intervening chapters we arrive at the following general findings concerning Perkins implementation.

Perkins III was at an early state of implementation in the states at the time the study was conducted. Nonetheless, the study found some progress toward implementation — for example, states and localities were directing Perkins funds appropriately; states were at least grappling with the implications of the accountability measures on their data-gathering systems; and states and localities were engaged in many efforts to improve vocational education quality. The Perkins legislation appeared to stimulate some program improvements more than others. Individual site progress, however, varied because of many factors.

As anticipated, state reforms have more influence on vocational education than Perkins does. The study found that most states have adopted such education reforms as academic standards, mandatory academic assessments and accountability for academic performance — reforms consistent with the Perkins goal of raising

the academic standards in vocational classes and improving academic achievement of vocational education students. This emphasis, however, had the effect in many local sites of emphasizing strong academic achievement at the expense of strong technical proficiency.

As anticipated, the financial incentives in Perkins and even the stronger threat of losing Perkins funds for poor performance are apparently not enough to counteract the greater influence of state general-education policies. The case studies provided ample evidence that the accountability mechanisms are not in place at this stage. Most state data systems in this study are unable to comply with all of the Perkins III reporting requirements, and data-gathering at local sites reflects state reporting requirements, not Perkins requirements. It may be that the data systems will evolve and accountability measures eventually will operate as hoped, but in several states it will likely take quite some time.

Some implementation problems identified in the study can be attributed to state and local conditions — for example, the relative level of centralization and coherence of the system, the history of education reform within the state, related policies and practices already in place, and the relative importance of vocational education within the state education policy sphere. Some conditions seemed more beneficial for implementation than others. The study found significant variation among localities within states with regard to the implementation of Perkins III–related practices, but this variation was minimized in the two states with more highly-centralized and more-coherent education systems. States with decentralized and fragmented systems tended to produce more local variation. These differences in state governance may affect implementation of any federal policy, not just Perkins.

A second set of barriers to implementing the Perkins vision of an integrated academic and vocational education is the historical separation between academic and more occupationally-oriented education, which has been discussed in many studies (Benson, 1997; Benson and Hayward, 1993; Grubb, 1995). In this study, the teacher survey results illustrate this separation. The survey found significant variation in practice between academic and vocational teachers and between teachers in comprehensive high schools and vocational schools. Vocational teachers in general reported adopting more practices consistent with a vision of integrated academic and vocational education, while academic teachers emphasized more traditional roles and academic achievement. This suggests

that vocational teachers are indeed taking the lead in establishing integration, as the Perkins legislation implies. However, as Benson (1997) pointed out, vocational teachers are not honored in the education community and are a minority in most secondary schools. A minority, then, must gain the support of site and district administrators and other teachers to make major changes. The study also shows that most schools do not support activities that can encourage integration, such as team teaching, joint planning time for teachers and career planning.

The Perkins legislation also has some weaknesses that help create implementation challenges, which have been documented in earlier studies. First, it is aimed at vocational education only and channeled through state and district offices of vocational education — yet the reforms must engage academic teachers and interests to be successful. Even when the Perkins reforms align with other reforms, their origin in vocational education isolates them from other reform efforts (Grubb, 1995). Second, some of the fundamental ideas in the Perkins view of reformed vocational education — such as curriculum integration — are poorly defined. As in Perkins II, this sets up a situation that is on the one hand potentially ripe for experimentation and innovation but that on the other may be so non-prescriptive that it fails to create recognizable changes (Stasz and Grubb, 1991). This lack of definition contributes to the variation in practice observed in this study and makes it difficult to communicate a coherent vision to others.

In conclusion, the findings from this study of seven states indicate that Perkins III remains a relatively weak policy for implementing a strong federal vision for vocational education. As with previous vocational education legislation, Perkins III uses a combination of policy instruments. Federal policymakers have recognized the limits of mandates in vocational education programs, particularly in a federalist system where authority and power are shared among government levels and where local programs must meet the needs of different client groups and labor markets. Therefore, they provide inducements or fiscal resources to states in the expectation that states will deliver services to specific groups, especially the economically disadvantaged, as discussed in Chapter Three. However, the potential for slippage between policymakers' expectations and local implementation is high because inducements encourage variation, especially when set in highly-variable contexts. To temper this trade-off, policymakers have added secondary policy instruments. Perkins II and III included

capacity-building mechanisms that directed funds toward specific program improvements. Perkins III also added stronger mandates than previous vocational education legislation by holding states accountable for performance targets in four areas. This combination of inducements with secondary policy instruments is meant to direct lower levels of government to implement programs consistent with federal expectations and simultaneously send the signal that certain minimum standards must be met as a condition for funding (McDonnell and Grubb, 1991).

Because states have greater leverage over local education agencies than the federal government has, their policies can carry more weight. In this study's sample, Perkins policies were being enacted consistent with state structure, policy and interests but not necessarily completely consistent with federal intent. In an era of standards-based reform, Perkins III and concerns about vocational education are overshadowed by state academic standards and assessments and accountability systems that often ignore vocational and technical learning. While study sites were aware of and working toward most — but not all — of the quality practices described by Perkins II and III, these efforts were largely on the margins of important other state reforms. Significantly, vocational education policies were strongest and most consistently implemented — or had at least the most promise of implementation — in more centralized states that were able to use policy mandates to secure local compliance. But these states were not necessarily following federal policy. Rather, they were reforming vocational education to meet state conditions and needs.

This report indicates that Perkins III has undoubtedly made some important contributions to improving the quality of vocational education — for example, in supporting technology-related improvements and encouraging greater attention to student outcomes, and it will likely continue to support vocational education in many ways. But it is too soon too tell whether the stronger mandates in Perkins III accountability will have the desired effect, and some of the philosophical, structural and incentive barriers will not likely be overcome by time alone.

Appendix A: Selection of States and Schools

This appendix provides details on the procedures and criteria for selecting case-study sites.

State Selection

Seven states were included in the case studies: California, Florida, Massachusetts, Michigan, North Carolina, Ohio and Texas. Each of the states shares the following characteristics:

- They each have data systems in place that provide information about student achievement and vocational education participation.
- They have significant academic and vocational education reforms under way that should lead to improved vocational offerings.
- Experts recommended them based on knowledge of the state's progress and innovation. Several of them have significant work under way to strengthen workforce development and to forge stronger links between secondary and postsecondary vocational programs.
- As a whole, they balance the need for geographic diversity, population concentrations/locale, and different types of vocational schools.

The states in the sample provide variation on demographic and programmatic dimensions that allow us to describe implementation of Perkins III. The states in the sample account for about 38 percent of the nation's K–12 student population.

Selection Criteria

To identify states for the case-study sample, two main criteria and several secondary criteria were used. To address questions about the relationship between school performance and implementation, the sample of schools needed to vary on some measure of student achievement. In addition, because we are interested in vocational education, the schools in the sample must include sufficient vocational program offerings. These two characteristics — achievement and vocational intensity — constitute the main selection criteria for choosing schools. Thus, they are the main criteria for

selecting states. Secondary characteristics — geography, demography, vocational education structure, presence of academic school reforms or workforce development initiatives, and linkages to postsecondary schools — were considered to ensure variation in the types of sites visited. Information about states was collected through a variety of sources, including document review, Web site review, interviews with state officials, expert opinions, and other studies and databases.

Selection Procedures

We reviewed the availability and accessibility of state data on academic achievement, vocational enrollment and student demographics. The primary source of information was state department of education Web sites. Additionally, we interviewed experts, asking them which states had undertaken significant academic, vocational or School-to-Work reforms and had attempted to build strong relationships between secondary and postsecondary institutions. Then, we further investigated availability of state data for states that received strong or multiple nominations from experts. To be included in the sample, states needed to provide school-level student achievement data, vocational enrollment data and a file that linked the state's identifiers for schools to the National Center for Educational Statistics identifiers for schools in the Common Core of Data — to provide demographic information.

For states with sufficient data available, we reviewed state reforms and the structure of vocational education. We looked for states that had undertaken reforms, such as new academic and vocational standards, identification of required occupational skills, increased graduation requirements, elimination of the general track, institution of statewide integration or Tech-Prep programs, or adoption of applied academics or certificates of mastery. We identified the types of vocational delivery systems in states, such as area vocational schools, comprehensive high schools and vocational schools.

After compiling and examining data from different sources, we identified approximately 10 states that had reasonable, easily accessible — or available upon request — data and that had instituted some type of reform that might be expected to improve vocational education quality. We also considered geographic diversity and demography to ensure that the sample would repre-

sent different regions of the country, a range of demographic characteristics — for example, high and low minority — and both urban and rural sites. In consultation with our project officers, we identified a list of seven states for study: California, Florida, Michigan, New York, North Carolina, Ohio and Texas. Massachusetts replaced New York in the sample when New York declined to participate.

School Selection

In selecting school sites, we strove to be objective and consistent and to identify sites that could provide meaningful data about vocational education in a range of settings. The sample was selected to balance various vocational programs and school characteristics. The process had three main components: analysis of achievement data, screening for vocational intensity and consideration of school characteristics to provide balance throughout the sample. Each of the schools shares the following characteristics:

- Relative to other schools in the state, they have either high or low student achievement after adjusting for the demographic characteristics of their students.
- They have significant vocational programs; the schools' vocational enrollment exceeds the state's median enrollment.
- As a whole, they balance the need for geographic diversity, concentrations of population/locale and different types of vocational schools.

Analysis of Achievement Data

We analyzed student achievement data in each state and classified schools based on actual school performance compared with predicted performance. Some might argue that selected schools for a study of the quality of vocational education should be based on their vocational and technical performance. However, very few states assess students' vocational and technical performance, and, where they do, it is not always available by school. This was the case even in states where the main vehicle for vocational education was in an area vocational school or in technical school. Thus, we used academic achievement data to stratify schools' performance. Available state data systems did not test or track student performance to the area vocational school. Then, the selection

process concentrated on comprehensive high schools. Nevertheless, the study includes AVSs associated with the selected comprehensive high schools from which they draw their students.

To stratify schools by performance, we conducted regression analyses using school-level data that adjusted school performance for school characteristics, including the demographics of the student population. We identified schools that seemed to be performing above or below expectations, given their characteristics. State assessments at the high-school level were used as measures of school performance. While the assessments were unique to each state, sufficient variation in each state's results differentiated school performance. For each school, we created a single achievement measure by averaging standardized state test scores using multiple years of test results — where available.

The model for predicting achievement included measures of racial and ethnic distribution of a school's students, percentage of students eligible for free or reduced-price lunches, school locale, and school size. This information was drawn from state databases or the Common Core of Data. Regression models for each state differed slightly, depending on the type of data available and the distributions within the dataset. For example, in some states many schools had three or more sizeable ethnic groups, while in others, most schools had only one or two such groups. Where available, we also considered alternative models that included such variables as percentage eligible for public assistance, percentage gifted and percentage of students classified as limited English proficient. Results tended to be robust to the inclusion of the additional variables and given that such additional variables were not available in all states, we restricted predictors in the model to allow for consistency across states.

The regression models provided adjusted achievement ranks for each school. On the basis of these ranks, we selected two samples from each state. The first sample — "low-performing schools" — included 15 schools chosen at random from the 10th to 30th percentile of schools, as determined by the adjusted ranks. The second sample — "high-performing schools" — included 15 schools chosen from the top quintile of schools, as determined by the adjusted ranks.

Screening for Vocational Intensity

Selected schools were then screened for vocational intensity by identifying the percentage of students enrolled in a vocational class at each school. State departments of education provided their own internal data on vocational enrollment, with the exception of Florida. In Florida, we used commercially available data from Market Data Retrieval to determine the concentration of teachers classified as vocational in a school as a proxy for vocational enrollment of students. Using vocational enrollment data, we identified the 30 selected schools on each state's list whose vocational enrollment exceeded median enrollment. Interpretation of vocational enrollment information across states was challenging because states, and often schools in the same state, have different definitions of vocational enrollment or vocational courses. Some state databases count every student taking a vocational course, while other states only consider students who are enrolled in a sequence of courses. Also, some states include all vocational classes in the database while others exclude classes that are commonly taken but not part of a vocational track, for example, keyboarding or computer literacy. Thus, the level of vocational intensity varied significantly across states with the median school in Texas having 62 percent of students enrolled in vocational courses and the median school in Michigan having 23 percent participation. We removed schools with vocational participation below the median, therefore ensuring that schools in the sample had high vocational participation relative to the entire state. Our assumption is that at least half of the schools in the state have meaningful participation.

The exception to the process was Massachusetts, which entered the study as a replacement state. In Massachusetts, we ranked all schools on the basis of our standard achievement analysis, but, rather than selecting random samples for screening for vocational intensity, we screened all schools in the state — including only schools with five or more approved vocational programs. The state provided us with a list for this purpose.

Consideration of School Characteristics

Representatives from state departments of education reviewed the screened lists of about 30 schools. They were asked to identify schools without significant vocational enrollment and schools that should be excluded because of administrative problems or crises

that would preclude data collection. In a few cases, administrators provided additional vocational enrollment data, but none of the administrators identified schools that should be excluded on the grounds of administrative problems or crises. During the process, a few state administrators raised concerns that some lists contained many very small, rural school districts with limited vocational offerings. Some were concerned that the schools on the list did not receive (significant) Perkins funds because the funds were directed to districts with numerous special populations. In Florida, none of the schools selected receive Perkins funds because they are directed to a few urban districts. Additionally, we investigated some state administrators' concerns — for example, the seeming paucity of urban schools on the list. In some cases, many urban schools did not meet the performance criteria, either being "average" or performing at an extremely low level. Other urban schools met performance criteria but did not make the candidate list because of the process of random selection.

From the reviewed list, we also considered secondary criteria: geography, locale and accessibility. Within each state, we sought to represent regions as well as provide some urban and rural representation. A few schools were excluded from consideration because of their extreme remoteness that would make site visits impractical. Additionally, schools with competitive and selective admissions processes for all students were excluded from the study. In each state, two pairs of high- and low-performing schools with similar locale and representing the range of regions were selected. If more than one candidate existed for the selected pairs, schools were selected randomly within each performance group.

Once four schools were identified in each state, we gave state administrators an opportunity to review the final selections. State administrators also advised us on local protocol for asking schools to participate in the study. In almost every case, state administrators provided a letter of introduction and support for the study, which was sent to the schools along with a letter from the research team. RAND and MPR then followed up with calls to the principals to describe the study and secure participation. At schools where the majority of vocational education occurred at an off-site facility, such as an area vocational school, we approached the AVS along with the selected school.

Replacing Schools

Of the 28 schools selected initially, 21 agreed to participate. Seven schools — five high-performing and two low-performing — refused for a variety of reasons. At three sites, we had to replace candidate schools twice because the backup schools also refused. A common reason for refusing was the principal's feeling that the school was overwhelmed with extraneous activities, such as state testing, other research studies, Office of Civil Rights visits and natural disasters. In one case, the district barred schools from participating in research. In a few schools, including a school where overcrowding resulted in an abrupt moratorium on all vocational education, not enough students were enrolled in vocational education to warrant participation in the National Assessment of Vocational Education. Replacements were randomly chosen from the same performance stratum as the original site and, when possible, from similar locale and geographic area of the state. When selecting replacements, we gave preference to other schools from the initial screening sample. If necessary, we extended the pool of possible replacements to any school in the state in the correct performance stratum with sufficient vocational enrollment and from a similar region and locale.

Appendix B: Survey Sample Design

In this appendix we describe the sample design for the National Teacher Survey conducted as part of the National Assessment of Vocational Education. The main purpose of the survey was to assess the extent to which strategies promoted by the Perkins legislation have found their way into vocational education practices. The survey was designed to answer the following questions:

- How prevalent are quality practices in vocational and technical education?
- How do practices in comprehensive high schools compare with those in area vocational technical schools?
- How do practices reported by vocational teachers compare with those of academic teachers?
- Which practices are unique to vocational education and which to general reform?

The universe for our study includes all vocational and non-vocational teachers of selected subjects in public secondary schools in the United States. Secondary schools include comprehensive or regular schools as well as vocational schools and area vocational centers. To be consistent with the previous NAVE, we limited our population of schools to include only public schools with 11th- and 12th-grade students. The universe excludes all itinerant teachers — unless their home base is the sampled school —, substitute teachers, special education teachers and teachers teaching only physical education or music.

The Sampling Frame of Schools and Teachers

The basis for the sampling frame of the universe was the Market Data Retrieval K–12 Public School Data Base, school types senior high schools and vocational technical schools, which excludes adult and continuing education programs. MDR guarantees that the list of schools is complete.[25] The sampling frame excluded from this list schools without 11th- and 12th-grade students. The frame also excluded alternative and special education schools as defined by MDR. The frame included 16,945 schools.

[25] MDR's list is a complete list of school buildings.

We compared this frame to the 1998 Common Core of Data maintained by the National Center for Education Statistics. For the comparison, the CCD list excluded schools classified by the CCD as alternative or special education. The MDR list contained almost all schools on the CCD, and MDR verified that to the best of their information schools not on the MDR list were not in operation. The comparison between the two lists revealed errors in the CCD. For example, the CCD maintained school names and addresses that were out of date — and in at least one case, many years out of date. Therefore, the frame for the teacher sample included only the schools on the MDR list.

A teacher sampling frame was compiled at each sampled school by first creating a roster of teachers employed at the school and then identifying sample-eligible teachers on the roster. Rosters were obtained using a two-stage process. First, RAND purchased teacher lists for sampled schools from MDR. MDR maintained teacher lists for all but one of the sampled schools. For the next stage of roster building, RAND staff contacted the office personnel at every sampled school and requested that the staff verify the accuracy of the MDR list or provide an alternative. When available, the final roster was the corrected list of teachers provided by the school. Otherwise, the roster was the MDR list augmented by lists from QED, another vendor of school lists.[26]

The rosters contained teacher names and teaching assignments. Teacher eligibility was determined on the basis of the assignments. RAND staff compiled a complete list of assignments and reviewed each assignment to determine eligibility. The sampling frame at each school is the roster of teachers with eligible teaching assignments.

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[26] For schools that relied on the MDR lists, we also purchased lists from QED to fill in any omissions from the MDR lists. A QED list replaced the MDR list for one school and for a small number of teachers at other schools. The job titles provided by QED were more specific than those provided by MDR, and the QED titles were used for determining eligibility and assigning the teachers to strata. We compared the MDR and school roster for a sample of schools. Among those schools, the rosters agreed 86.3 percent of the time for eligible teachers. The high rate of agreement between rosters for schools that responded to our requests might overstate the agreement for schools that did not. One might expect that schools that did not respond to our request were probably more likely to not provide data to MDR, which would lead MDR to use alternative sources for data and reduce the accuracy of the MDR roster.

Sampling Strata

The sample design used for this study was a two-stage stratified sample. The first stage sample was a stratified random sample of schools. The second stage sample was a stratified random sample of teachers from the selected schools. We first describe the strata used for the first stage of sampling and then discuss the teacher strata.

Schools were stratified by school type — for example, comprehensive or vocational — and size of the teaching staff. All schools in the frame were first classified as either comprehensive or vocational. We first describe the vocational strata and then discuss comprehensive schools.

Vocational Schools

To enhance comparisons between the current study and the previous NAVE, we planned to classify schools as vocational using the previous study definition of a vocational school. The previous NAVE study reported that vocational schools were defined as schools that provided "only vocational education," (Muraskin, Hollinger, and Harvey, 1994, p. T-6). All other schools were classified as comprehensive or regular for that study. We could not locate a readily available source that identified the universe of schools offering only a vocational course of study. Using data from MDR, we were able to determine which schools had only vocational teachers. However, our school frame contained far fewer schools with only vocational teachers than the number of vocational schools reported by the previous NAVE study. Therefore, we contacted the researchers who conducted the previous NAVE to determine the data source they used for stratifying schools. Several of these researchers reported that they recalled using the QED list of vocational schools, and the published reports from the previous study state that QED provided the sampling frame (Muraskin et al., 1994).

In 2000, the QED universe of vocational schools was similar in size to the MDR universe. In addition, the two data sources used similar definitions of vocational schools — QED did not define vocational schools as schools providing only a vocational course of study. Therefore, we determined that the MDR classification of schools was comparable to the QED and that using the MDR definition would produce estimates that are substantively interesting

and comparable to the previous NAVE.[27] The following is MDR's definition of a vocational school:

> A Vocational School is a school ... separately organized under the direction and management of an administrator (such as a principal) for the primary purpose of offering education and training in one or more of the skilled, semi-skilled or technical occupations. In some cases students attend the school full-time and receive their academic courses as well as their vocational courses. In other cases, students attend a vocational school part-time, receiving only their vocational courses there, and attend a regular high school for their academics. Vocational schools can also be referred to as Voc-Tech Schools and Technical Schools. (Market Data Retrieval, 2000.)

Schools were classified into either the vocational or comprehensive school stratum. The vocational school stratum contained all schools classified as vocational by MDR. The comprehensive school stratum contained all other schools. Table B.1 lists the number of schools in the population and the sample from each stratum. We sampled 134 schools from the vocational stratum and 234 schools from the comprehensive stratum.

Table B.1
Numbers of Schools by Vocational and Comprehensive Strata

Strata	Number of Schools in Population	Number of Schools in Sample
Vocational	1,216	134
Comprehensive	15,729	234
Total	16,945	368

We stratified vocational schools into schools from vocational local education agencies — LEAs with only vocational schools — and schools from mixed vocational and comprehensive LEAs — LEAs with both comprehensive and vocational schools. Of the 1,216 vocational schools, 356 (29.3 percent) were from vocational LEAs and 860 (70.7 percent) were from mixed LEAs. We further stratified schools from the mixed LEAs into area vocational schools or centers — AVS — and vocational high schools.

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[27] Teacher self-reports of school type agree with the MDR classification for more than 98 percent of teachers.

We classified a school as a vocational high school if it employed more than 15 teachers and less than 50 percent of these teachers were classified as vocational. Small schools or schools with a majority of vocational teachers were classified as AVS. Table B.2 gives counts of schools in the population and sample by the three vocational school strata.

Table B.2
Numbers of Schools by Vocational School Strata

Strata	Number of Schools in Population	Number of Schools in Sample
Vocational LEA		
All schools	356	50
Mixed LEA		
Vocational High Schools	77	10
AVS	783	74

We further stratified schools on the basis of the number of vocational teachers. For every school, MDR provided a count of vocational and other teachers. Although MDR reported that the counts should be accurate for most schools, they could not make precise estimate of the overall accuracy or the distribution of errors in the lists. Therefore, we used Common Core of Data enrollment data to predict the MDR teacher count. On the basis of this model, we identified low outliers — schools where the model greatly exceeded the MDR count. We assumed that these were schools where MDR had an inaccurate list. To get the most accurate prediction model, we iteratively excluded the low outliers from the data and refit the prediction model. We repeated this process until the data contained no additional low outliers. For the low outliers, we used the model prediction as our estimate of size rather than the MDR list. Using the data without the outliers, we then fit models for predicting the proportion of vocational teachers at a school. We used this model to estimate the proportion of vocational teachers for schools where we estimated the number of teachers. The product of these two estimates provided an estimate of the number of vocational teachers. The estimate of the number of other or academic teachers is found by subtraction — the estimated total minus the estimated number of vocational teachers.

The size strata and the number of schools per strata were determined to minimize the coefficient of variation in the teacher sampling weights for vocational teachers. The sampling weight is the inverse of the selection probability. The selection probability is the product of the probability that the school is selected and the

probability that a teacher is selected from a sampled school. School selection probabilities were determined by the sampling rate in each stratum. The teacher selection probability equals the number of teachers sampled divided by the number of teachers in the school. We sampled up to five vocational teachers from each vocational school. For schools with less than five teachers, we included all teachers. For other schools we chose a simple random sample of five teachers. Five teachers were chosen as a balance between the goal of limiting the design effects of the clustering of teachers within a school and the desire to limit the total sample of schools. We determined that a sample of 134 schools with (up to) five teachers from each would provide sufficiently precise estimates. Using these sampling rules, we determined the optimal size strata and strata allocations through Monte Carlo replications of the sampling procedure. Stratification by size — estimated number of vocational teachers at the school — and sampling roughly five teachers from every school resulted in a sample design that, across possible samples, produced stable sample sizes and within a sample variability of the weights that was small on average with a limited range. The final sample of vocational schools includes 134 schools and 659 vocational teachers.

Academic teachers in vocational schools make up only a very small fraction of the teacher population. We decided not to oversample these teachers. These teachers were not the main focus of our study and oversampling would have resulted in a large reduction in the precision of our estimates for all academic teachers, pooling across vocational and other schools. Therefore, we selected a small sample of academic teachers from the vocational schools. For each school we randomly chose the number of academic teachers to include so that the sampling rate for academic teachers in the vocational schools equaled the sampling rate for academic teachers in other schools. The final sample included 21 academic teachers from vocational schools.

Comprehensive Schools

We stratified comprehensive schools on the basis of the number of vocational and the number of academic (i.e., not vocational) teachers at the school. Using the same procedures described above we estimated the number of vocational and the number of academic teachers using the MDR counts and the CCD enrollment data. We then chose strata limits and allocations to minimize the expected coefficient of variation in the sampling weights for both

vocational and academic teachers. We again used Monte Carlo replications of the sampling procedure to determine the expected coefficient of variability.

On the basis of power calculations, we determined that we would sample 234 schools and would select simple random samples of five academic teachers and five vocational teachers from each school. For schools with fewer than five teachers of either type, all would be included. We modified the preliminary sample design to include (up to) five academic teachers from each sampled school, five vocational teachers for schools with 10 or fewer vocational teachers, and six vocational teachers for schools with 11 or more vocational teachers. We modified the sample to reduce the variability in the sample size and to ensure a sufficiently large sample of vocational teachers.

Teacher Strata

Within each school, teachers on the frame were classified as vocational or academic. The strata were defined using the teaching assignments listed on the sampling frame provided by the principal or MDR. The one exception is health teachers. We classified all health teachers as vocational because we expected that in some schools the assignment for health professions teachers was "health" or "health teacher."

Within each school a simple random sample of teachers was selected from each stratum. The sample sizes were determined according to the rules described above. The goal was a sample with 660 vocational teachers and about 20 academic teachers from vocational schools and 1,170 vocational and 1,170 academic teachers from comprehensive schools. The final sample as fielded included 659 vocational teachers and 21 academic teachers from vocational schools and 1,118 vocational and 1,160 academic teachers from comprehensive schools.

The teacher assignments used to stratify teachers for sampling were somewhat ambiguous for some teachers. For example, the assignment "computer teacher" might refer to a technology teacher in a vocational course of study or a mathematics teacher teaching academic courses. Therefore, we used teacher responses to survey items 16 ("What is your PRIMARY teaching assignment — that is, *in* what subject area do you teach the most classes this school year?") and 18 ("What is the *course title* of the FIRST class in your PRIMARY teaching assignment that you taught today [or on

the most recent regular school day]?") to determine if the sampling strata accurately reflected the teacher's assignment as either a vocational or academic teacher. We reclassified 58 teachers sampled as vocational teachers, who on the basis of their survey responses appeared to be academic teachers. We also identified seven teachers sampled as academic, who on the basis of survey responses were reclassified as vocational for analyses.[28]

Survey Response

We sampled 134 vocational and 264 comprehensive schools. Of these schools, one academic and one vocational school were found to be ineligible. Both ineligible schools were replaced by random sampling another school from the ineligible school's sampling strata. The weights for schools from those two strata were increased to reflect a reduction in the size of the school population for the strata.

Of the 368 eligible schools, six vocational and 16 comprehensive schools refused to participate in the study. For each of these schools, we selected a replacement school by randomly sampling another school from the refusing school's sampling strata.[29] Of this final sample of schools, 276 schools — 103 vocational and 173 comprehensive — returned the teacher rosters. We used MDR rosters for 26 of the remaining vocational schools and 56 of the remaining comprehensive schools. We were unable to obtain teacher rosters or approval for sampling for the remaining 11 schools — five vocational and six comprehensive.[30] Because we

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[28] Although academic teachers tended to have larger sampling weights than vocational teachers because of oversampling of vocational teachers, estimates were not greatly influenced by the responses of the small number of teachers sampled as academic but then reclassified as vocational.

[29] The replacement schools received the same weight as the refusing school. Using the original weight is similar to adjusting the weights and then weighting for non-response within the sampling strata. Using replacements will introduce only minimal bias if refusals are similar to other schools in the strata. The primary reason for refusing to participate was time pressure on teachers stemming from other activities, such as state and district testing or other research. It is not obvious that such activities will be directly related to teaching practices.

[30] Five of the schools required that we receive district approval before sampling teachers, and we were unable to obtain that approval during the fielding of the study, even though we actively pursued it throughout the study period. For the remaining six schools, we delayed using the MDR rosters because we expected to obtain rosters from the schools, but we did not obtain rosters in sufficient time for surveying teachers.

could only sample teachers in schools for which we obtained a roster, the schools without rosters are non-responding schools, and they reduce the overall response rate for the survey.

The teacher sample included 2,958 teachers (680 from vocational schools — 659 vocational, 21 academic; and 2,278 from comprehensive schools — 1,118 vocational and 1,160 academic). Of the 2,958 sampled teachers, 1,595 (54 percent) completed the survey instrument and an additional 148 (5 percent) reported that they were ineligible to for the study. Thus, according to the definition disseminated by the Council of American Survey Organizations (Frankel, 1983) the response rate for this sample equals $100 \times (1{,}595 + 148)/2{,}924 = 100 \times 1{,}743/2{,}958 = 59$ percent. Teachers who reported being ineligible tended not to teach high school students at the sampled school — some had left the school, others did not teach, others taught only adult or postsecondary education — or taught only special education.

McCaffrey, Duan, and Morton (2000) define the respondent coverage rate, which estimates the response rate among eligible teachers and allows for differential eligibility rates among non-respondents. To obtain this estimate we developed non-response weights — see details below — to weight up the responding teachers, both eligible and ineligible, to the entire sample. The product of the non-response and sampling weights equals the analysis weights — after trimming a few large weights.[31] The sum of the analysis weights equals the sum of the sampling weights for the original sample of teachers. The RCR estimates the proportion of the population that would respond to the survey if sampled. For this study, the RCR equals the sum of the analysis sampling weights for responding eligible teachers divided by the sum of the analysis weights for the same teachers. The RCR equals 59 percent for the overall sample, 66 percent for vocational teachers in vocational schools, 60 percent for vocational teachers in comprehensive schools, and 58 percent for academic teachers in comprehensive schools.[32]

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[31] To control variability of the estimators, we trimmed roughly the three largest weights for each stratum.

[32] Of the 21 sampled academic teachers in vocational schools, 16 responded and 13 were eligible. Because the sample is so small, we do not report the RCR for this group.

Adjustments for Survey Non-response

Response rates among the surveyed teachers differed across identifiable groups of teachers. For teachers, we had the following data for both respondents and non-respondents to uses for modeling response:

- School type — area vocational schools in vocational district, AVS in joint district, vocational high school in joint district.
- School size — estimated number of vocational and academic teachers.
- Source of roster — school or MDR.
- Teaching assignment — as listed on roster.
- School locale — urban, suburban or rural.
- Percentage of white, non-Hispanic students.

Racial-ethnic data were unavailable for almost all schools not listed in the Common Core of Data. All the comprehensive schools in the sample were found in the CCD and had racial-ethnic data. However, many of the vocational schools were not found in the CCD, and MDR did not provide racial-ethnic data for most of these schools. Thus, data on the racial-ethnic distribution was substantially incomplete for vocational schools and could not be used to predict response. We did obtain racial-ethnic and socioeconomic data from schools, but this was not useful for modeling response because it was available only for a subset of the schools and teachers.

We first discuss the response patterns for the vocational teachers from the vocational schools and then discuss vocational and academic teachers from comprehensive schools.

Vocational Teachers in Vocational Schools. We found that teachers from schools in vocational districts were more likely to respond than their counterparts in joint districts — in particular, teachers in area vocational schools in joint districts were least likely to respond (57 percent), while 67 percent of teachers for vocational districts responded. We also found that teachers from very small schools — few vocational teachers — had a very low response rate (28 percent), but school size was not systematically related to the teacher response rate among larger schools. Occupational home economics teachers were the most likely to respond at 69 percent,

and trade and industrial and technology/technical communications teachers were the least likely — 57 percent and 64 percent, respectively.

Teachers were more likely to respond when the school provided a roster than when we used the MDR roster. Several plausible reasons exist for the association between the source of the roster and the response rate. First, teachers from the MDR rosters were contacted later than most of the teachers on school-supplied rosters. To maintain the greatest accuracy in our frame, we wanted every school to verify the MDR roster. Therefore, we only used the MDR roster as a last resort after the school failed to provide a roster by the deadline required to allow us sufficient time to field the teacher surveys. Thus, samples from the MDR roster were fielded much later than the most of the samples from the school-supplied rosters, allowing less time for follow-up. The abbreviated follow-up could be a source of the lower response rates. Second, the MDR rosters could contain more ineligible teachers who did not report ineligibility than the school-supplied rosters. Third, almost all communications with the schools and teachers were through the school office and schools where the office did not provide a roster might have made less of an effort to ensure that teachers received the survey packets and understood the importance of completing the survey. Finally, schools with uncooperative offices might also be schools with uncooperative teachers — for example, schools that had teachers with very active schedules.

We modeled teacher response using the variables listed above. We first created non-response weights for the five non-responding schools — schools without rosters or permission to survey. Using these non-response weights we created temporary analysis weights for all teachers. We fit a weighted logistic regression model to predict response using the temporary analysis weights. The final model for predicting response included an indicator for whether the principal returned the staff list, indicators for small schools — fewer than five vocational teachers — and medium schools — five to seven vocational teachers — and indicators for technology and trade and industrial teachers.[33]

We used the propensity method of Little and Rubin (1987) to post-stratify teachers for estimating non-response weights. Teachers

[33] Academic teachers in vocational schools were treated as a separate post-strata for estimating non-response weights.

were stratified into five strata according to the size of the predicted probability of response from the logistic regression model. Within each stratum the response weight is the ratio of the sum of all teachers to the sum of the weights for the respondents.[34]

Vocational Teachers from Comprehensive Schools. Agriculture teachers had the lowest response rate (42 percent), followed by career education teachers (45 percent), and business teacher (54 percent). At the other extreme, health occupations teacher had the highest response rate (75 percent), followed by occupational home economics teachers (67 percent). Response rates were not systematically related to the number of academic teachers. However, teachers from schools with more than 20 vocational teachers had the relatively low response rate of 44 percent. Response rates increased with the percentage of white non-Hispanic students at the school. For schools where less than 25 percent of students are white non-Hispanic, the response rate was 46 percent, for schools with 25 percent to 75 percent white non-Hispanic students the response rate was 51 percent, and for schools with 75 percent or more white non-Hispanic students the response rate was 61 percent. Teachers were also much less likely to respond when the principal did not return a staff list than when he or she did (41 percent versus 65 percent).

The final model for predicting response included an indicator for whether or not the principal returned the staff list, an indicator for whether or not the school had 75 percent or more white non-Hispanic students, and indicators for health occupations and occupational home economics teachers. The model also included indicators for schools with less than 40, with 40 to 59 academic teachers, and with 11 to 14 vocational teachers. The model also took into account interactions between the indicators for the numbers of academic and vocational teachers. The predicted probability of response was again used to assign teachers to post-strata for estimating non-response weights.

Academic Teachers from Comprehensive Schools. Social studies teachers and teachers classified as other had the lowest response rates (51 percent and 47 percent, respectively). The response rates ranged from about 62 percent to 65 percent for teachers in all

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[34] Because health teachers sampled as vocational teachers had a high misclassification rate, they were treated as a separate poststratum for estimating non-response weights.

other disciplines. Response was not systematically related to the number of vocational or academic teachers in the school. Teachers from schools where less than 25 percent of students are white non-Hispanic were less likely to respond than teachers in other schools — 46 percent versus 60 percent. Teachers also were much less likely to respond when the principal did not return a staff list than when he or she did — 44 percent versus 66 percent.

The final model for predicting response included an indicator for whether or not the principal returned the staff list, an indicator for whether or not the school had 75 percent or more white non-Hispanic students, and indicators for social studies teachers. The model also included indicators for schools with less than 30, with 40 to 59, and with 60 to 89 academic teachers. The predicted probability of response was again used to assign teachers to post-strata for estimating non-response weights.

Standard Error Estimation

Linearization methods (Skinner, 1989) were used to estimate the standard errors for all parameter estimates. Replacement sampling was assumed for each stratum, even those with relatively large sampling fractions. A small simulation study supported the use of this estimator.

Creation of the Overall Teacher Quality Scale

The Overall Teacher Quality Scale is a maximum nine-point scale. It consists of six individual scales, which have been divided into two or three categories each. The variables used to create the scale are given in parentheses, and the name of the final scale is given in capitalized letters.

Q22. Use of Standards (q_22a_related–q22d_related, q22a_affect–q22d_affect)

Survey Item 22: Are there any curriculum standards or student performance standards related to the identified class? If so, to what extent do the standards affect your teaching in the identified class?

(Check yes if standards exist; if yes, check 1 (not at all), 2 (a slight extent), 3 (a moderate extent), 4 (a great extent). Standards listed

are a) state-adopted, b) district-adopted, c) industry-adopted, d) school-adopted.

For each of the four standards (state-adopted, district-adopted, industry-adopted or school-adopted), we created two variables. The first variable, q22_related, refers to whether the standards related to the identified class. The second variable, q22_affect, refers to what extent the standards affected teaching in the identified class.

The scale takes the maximum value of q22a_affect through q22d_affect. We recoded q22a_affect through q22d_affect using information from items q22a_related through q22d_related. If the teacher indicated that a standard was not relevant to the class, the corresponding response regarding the extent to which the standard affected their teaching was recoded from legitimate skip ("S") to 1 (for example, "does not affect teaching at all."). Then, the maximum value of q22a_affect through q22d_affect was found. Once the maximum value was found, two groups were created such that those who indicated moderate to great extent (for example, 3 or 4) constituted one group (recoded as 1) and those who indicated none or little extent (for example, 1 or 2) constituted another (recoded as 0). This final, dichotomized scale is called MAXAFF, and takes a maximum value of 1 point.

Q20. Academic and Technical Quality (Academic Quality, q20a, q20b, q20d; Technical Quality, q20c, q20f)

The Academic Quality Index consists of three items: q20a (class fulfills academic requirement), q20b (class is designated as honors) and q20d (class has articulation agreement). The Technical Quality Index consists of two items: q20c (class leads to certificate of occupational skills) and q20f (class includes paid related internship). Question 20 asked, "Do any of the following features apply to the identified class?" (Check yes or no).

All these items were recoded so that 0 = "no" and 1= "yes." The relevant items were summed within a scale so that the Academic Quality Index ranged from 0 to 3 and the Technical Quality Index ranged from 0 to 2. The Academic Quality Index was then further divided into three groups so that teachers who received a score of 0 constituted one group (recoded as 0), those who received a score of 1 constituted another (recoded as 1), and those who received a score of 2 or 3 constituted a third group (recoded as 2). This scale is called ACADEMIC_INDEX, and takes a maximum value of 2

points. The Technical Quality Index was dichotomized so that those who scored a 0 made up one group (recoded as 0) and those teachers with a score of 1 or 2 were the other group (recoded as 1). This scale is TECHNICAL_INDEX and takes a maximum value of 1 point.

Q24. Assessed Competencies (q24b, q24c, q24e, q24h, q24j, q24f, q24g, q24i, q24k)

This item asked: "To what extent do each of the following competencies contribute to students' grades in the identified class?" Check 1 (not at all), 2 (a slight extent), 3 (a moderate extent), 4 (a great extent). The list of competencies are b) advanced reading skills; c) writing skills; e) advanced mathematics skills; h) research/reference skills; j) creative thinking and problem-solving skills; f) oral communication skills; g) teamwork skills; i) ability to use technology to solve problems; and k) ability to apply academic concepts to occupation-related tasks that might be found in a job or career.

Responses for items relating to the above competencies were summed, then divided into three groups. The first group was those whose competency score was 20 or less (recoded as 0), the second group was those whose competency score was between 21 and 29 (recoded as 1), and the third group was those whose competency score was greater than 30 (recoded as 2). This scale, COMPETENCIES_OVERALL, takes a maximum value of 2 points.

Q17. Teacher Quality (q17)

Item 17 asked, "Do you have a teaching certificate in your state in the same subject as your primary teaching assignment?" Check 1 (yes), 2 (no), or 3 (not applicable).

"Not applicable" responses were recoded as "no." A 2-point scale, CERTIFICATE, was created that takes on the value of 0 if the response is "no" and 1 if the response is "yes." The maximum value of CERTIFICATE is 1 point.

Q25. Amount of Homework (q25_hr q25_min)

Item 25 asked, "For the identified class, how many hours of homework were assigned in the last five school days?" Respondent wrote in number of hours and minutes.

The amount of homework within the last five days was first converted to minutes. The number of minutes was then divided into three groups. The first group (recoded as 0) consisted of those who assigned between 0 and 50 minutes of homework, the second group (recoded as 1) consisted of those who assigned between 51 and 150 minutes of homework, and the third group (recoded as 2) consisted of those who assigned more than 150 minutes of homework. This scale, HOMEWORK, takes a maximum value of 2 points.

Overall Teacher Scale

The 9-point overall teacher scale (TEACHER_QUALITY) was created by summing up the dichotomized or trichotomized individual scales.

Appendix C: Efforts to Improve Quality — Summary Tables and Analysis of "High-Performing" and "Low-Performing" Schools

This appendix first provides summary tables in support of the case-study analysis. The tables show, for each of the seven states, how high- and low-performing schools in each state were implementing the program improvements discussed in Perkins III. Each table lists different indicators used to assess local efforts to improve. Throughout, 1 or 2 designates a high-performing school; and 3 or 4 designates a low-performing school. In cases where a local site was represented by more than one school (for example, a high school and a regional occupational program or area vocational school), the identifying number is further qualified as applying to the high school only, the ROP or the AVS.

As discussed in Chapter Two, the analysis of high- and low-performing schools with respect to a number of quality indicators associated with the Perkins program improvements yielded few differences. This stemmed undoubtedly partly from the sampling problems discussed in that chapter and does not necessarily mean that vocational education does not or cannot affect academic achievement.

Following the tables, further narrative describes the interpretation of these data that led us to the overall conclusion that high- and low-performing schools are *not* implementing Perkins differently. We used simple counts for this analysis. One count included all 28 schools in the sample. A second count included only the 13 "pure" schools — the schools sampled according to the original design and in which vocational education was provided. These 13 schools — seven high-performing and six low-performing — constitute the subset of schools in which the analysis of high and low schools can be carried out as originally intended. These schools are found in four states — Florida, Massachusetts, North Carolina and Texas — as follows:

High — FL2, MA1, MA2, NC1, NC2, TX1, TX2

Low — FL3, MA3, MA4, NC4, TX3, TX4

Table C.1
Integration Structure

	California	Florida	Massachusetts	Michigan	North Carolina	Ohio	Texas
Vocational as stand-alone courses	1, 3	none	none	All sites	none	1, 2, 3, and 4 AVS	1, 2, 4
Vocational as sequence of courses (vertical align.)	1, 4 3 ROP	all	2, 3, 4	1, 2, 3	all	1, 2, 3, 4 AVS	all
Pre-apprenticeship	none	none				3 AVS (some)	
Career academies	1 (5), 3 (2)	1 (1), 2 (2), 3 (1), 4 (1)	none	1	none	3 AVS	2 (1), 4 (1)
Career pathways	1 ROP, 2 (7), 3 (planned)	all	all	1, 2, 3, 4 AVS	all	1, 2 AVS, 3 HS, 3 AVS (planned)	all
Other organization	ROP at all sites		1 HSTW, 2 several, 3 HSTW	AVS at all sites	3 HSTW	AVS at all sites	3 HSTW, 4 Accelerated Schools
Grouping of career students in same academic classes	1 and 3 academies only	1, 2 in academies	none	1	none	2, 3 AVS	2, 4 in academies
Block scheduling	3 (1 ROP)	1, 3	2, 3, 4	1 and 4 AVS	all	1, 2–4 AVS	2, 4
Academic/ vocational team teaching	none	3 in academy	3, sometimes	2 AVS	2 in computer class	2 HS, 4 AVS (some)	3 developing units now
Common planning time for teachers	1 and 3 academies only	none	2, 3		none	none	2, 4

Table C.2
Integration Curriculum

	California	Florida	Massachusetts	Michigan	North Carolina	Ohio	Texas
Increase academics in vocational	2, 3	all	all	1 AVS, 2, 3 AVS	all	2, 3 AVS, 4 AVS	all
Increase vocational/careers in academics	3	none	none	No evidence	none	No evidence	none
Senior projects	1, 4	2 next year	3, 4	No evidence	1, 4	AVS at 1, 2, 3	3
Horizontal alignment	1, 3 (academy)	1 in academy	2, 3, 4	1	all	4 AVS (some)	3
Vertical alignment	1, 2, 3 ROP	all	2, 3, 4	1, 2 (some), 3	all	1, 2, 3 (some), 4	all
Project-based learning	1 and 3 academy, 2 (some)	all	2, 3, 4	3 (some) and 4 AVS	all	2, 3 AVS (some)	all
Connections to work (e.g., job shadow, speakers)	1 (some programs), 2, 3, 4	all	all	2 some, 1 and 4 AVS	all	2, 3 AVS	all
Work-based learning	All sites for some programs	all	all	1 AVS, 2 (some), 3, 4	all	1 AVS, 2, 3 AVS, 4	2, 3, 4
Credit for WBL	1, 4, 3 ROP	1, 2	2, 3, 4	2, 3, 4 (some programs)	all	2 AVS, 4	2, 3, 4
Class seminars to discuss WBL	4 (one class)	1	3	4 (some)	none	4 HS (some)	none
School-based enterprise	2, 4	1	4	3, 4 AVS	2	AVS at 1, 2, 4	none

Table C.3
Challenging Academic and Vocational Standards

	California	Florida	Massachusetts	Michigan	North Carolina	Ohio	Texas
Vocational courses meet certain academic standard	2 (eliminated applied English)	all	no	Eliminate keyboarding for vocational credit		Eliminated keyboarding for vocational credit	no
Vocational courses earn academic credit	1 and 3 academies, 2 (some programs)	all	no	1, 2 (some AVS), 3 (some)	no	2, 3, and 4 (some)	no
Vocational courses earn college credit	2 (some programs), 3		3, 4	1, 3	all	2 AVS (some); 3 and 4 AVS	all
Vocational courses earn skill certification	4 (some programs)	1 — offered at nearby CC, 2	all	2 AVS, 4	2, 3	1, 2, 3 and 4 AVS	2
State academic standards influence vocational	1 and 3 academies, 2, 4	all	all	3, 4	all	1, 3 and 4 AVS	all
State academic tests influence vocational		all	all	1, 2, 4 (writing in all CTE classes)	all	All sites	all
State vocational standards/tests influence vocational	checking	all	none	2, 3 (district standards for 1, 4)	all	All sites	all
College standards influence vocational	1, 2, 3	no		No evidence	no	AVS (some); 3, 4 (Tech-Prep)	1, 2, 4
Industry/SCANS standards influence vocational	1 and 2 (some), 3 academies, 4 ROP	all	all	all	all	1, 2, 3 and 4 AVS	2, 3
Pressure to raise academics in vocational	1, 2	all	all	all	all	2, 4	all

Table C.4
Connections to Employers and Community

	California	Florida	Massachusetts	Michigan	North Carolina	Ohio	Texas
EMPLOYERS							
Industry advisory groups in some programs	1 and 3 academy 2, 4 ROP	2, 3, 4	all	1, 2, 3, 4 AVS, 4 HS (one program)	1	1 (some), 2, 3 AVS, 4	1 (very few), 3
Participate in schoolwide committee	1 and 3 academy		all	1, 2	2, 3, 4 all at district level	4	2 at district level
Advise on curriculum	1 academy, 2		4	1, 2, 3, 4 AVS	2, 4	2, 3, 4	1, 3
Advise on industry skill needs	1 and 3 academy, 2 ROP		3, 4	1, 2, 4 AVS	1, 2, 3	All sites	1, 3
Review student work/portfolios	1 academy, 4 2 ROP		4		1	2, 3, 4	none
Provide job-shadowing or mentoring	1 and 3 academy 2 ROP			1, 2, 3, 4 AVS	1	1, 2, 3	1, 3
Provide work experience	1 and 3 academy	2	2, 3, 4	1, 3, 4 AVS	all	All sites	2, 3, 4
Hire students	1, 2	2, 3	all	All sites (some programs)	all	1, 2, 3	2, 3
Provide feedback on student work performance	1, 2 ROP, 3 academy		1, 3, 4	1, 3, 4	1, 2	1, 2, 4	none
Donate materials/ assist funding	1 and 3 academy	2, 3	3, 4	4	1, 2, 4	1, 2	1, 3
PARENT INVOLVEMENT	1 and 3 academy			1, 2	All — for course of study choice	3 (Tech-Prep)	
CTSO INVOLVEMENT	CA2 (Ag program)	3 (many)		No evidence	2	1, 2, 3	

Table C.5
Connections to Postsecondary

	California	Florida	Massachusetts	Michigan	North Carolina	Ohio	Texas
CC faculty on advisory board	1 academy, 4	3		1, 4 (one program)		2, 3 (AVS)	3
CC provides PD for teachers	3				1	2 HS	
CC shares info on requirements	2					1, 2 and 3 AVS	1, 3
CC gives placement tests at HS	2						
Some HS teachers teach at CC	4			4		2	
Share info on job skill needs	2			1		1, 4, 2 and 3 AVS	
Joint curriculum, program planning	3			4 (one program)		1 and 4 (Tech-Prep), 2 and 3 AVS	4
Share technology or labs	1					1 AVS (Tech-Prep)	
Articulation infrequent	3						1, 2, 4
Articulation: few courses/programs		1, 2, 3	3, 4	4 HS		1 AVS (some)	3
Articulation: many courses/programs	1, 4, 2			1, 3, AVS at 2, 4	all	2 AVS, 3, 4	
Articulation: 4-year institutions	4, 2 ROP			1, 3, 4 (some programs)			
Program to assist college entry	4			1		4	

Table C.6
Counseling and Career Planning

	California	Florida	Massachusetts	Michigan	North Carolina	Ohio	Texas
Counseling focus on college	1, 2			2, HS at 3, 4		1, 2 and 4 HS	1, 2
Counselors do college and career	1, 2, 3	1, 2	all	1, 4	all	2, 4	1, 3, 4
Dedicated career counselors	1 academy, 2	2	none	1, 2	2, 3	2 AVS, 3, 4	3; 4
Counselor PD on careers				2, 3 (limited)	3	1, 2	
Students complete 4 year plan	All sites	1, 2	2, 3, 4	1 AVS, 2, 3, 4	all, mandated	2, 3, 4	3, 4
Plan reviewed regularly	4	1, 2	2, 3, 4	1 AVS, 2, 3, 4	all	3, 4 AVS	3
Career fair/center	All sites	1, 2	2, 3, 4	1, 2	all	2, 4	2, 3, 4
Planning activities or portfolios	1 academy, 2 ROP, 3, 4	2	3, 4			2, 4	
Career interest inventories	3, 4	all	2, 3, 4	1, 2, 4	all	2, 3, 4	2, 3, 4
Career planning units in courses	All sites		4	3		4 (planning)	1, 3
Course on career planning		1, 2	3, 4		All in 8th grade	4 AVS	3, 4
Course/exposure to CTE options		1, 2	3, 4	1, 3, 2 AVS	All in 8th grade	2, 3, and 4 AVS	3, 4
Career planning before HS	2, 4	1, 2	2, 3, 4	All sites	All in 8th grade	2, 3, 4	4

Table C.7
Technology Policy and Resources

	California	Florida	Massachusetts	Michigan	North Carolina	Ohio	Texas
School has technology policy	2, 3 and 4 are "Digital HS"		2, 3, 4	1, 2, 4	all	4 AVS	
Computer literacy requirement	1, 4	all		2	all, mandated keyboarding	2, 4 AVS	all, required
Employers advise on technology	1, 3 (some programs)	all	2, 3, 4	1, 2	all	1, 2, 3	3
School has high-tech program, e.g., Cisco engineering	3, 2 (planned)	2	2, 3, 4	2 AVS, 3 AVS and some at HS, 4 (some)		1 (some), 2 3 AVS, 4 AVS	2
Curriculum incorporates technology knowledge/skills	4, 1 and 3 (some programs)	all	all	2, 3 AVS and some at HS, 4	all	1 (some), 2, 4 AVS	3
Teachers receive PD for technology	2, 4			2	all	2 & 4 AVS	
Teachers satisfied with amount or quality of technology	2 not satisfied	1, 2 not satisfied	1, 3, 4 not satisfied	4 varied, 3 AVS yes, HS no	4	2 yes 1 & 3 varied 4 AVS yes, HS no	
Perkins funds used for technology	All sites	all	all	1, 4	all	1, 3, 4	all

Table C.8
Teacher Supply and Professional Development

	California	Florida	Massachusetts	Michigan	North Carolina	Ohio	Texas
Vocational teacher shortage	All sites	2		2, 3, 4		1, 2 4 (anticipated)	2
Shortage has affected programs	1, 2			2, 3		4	
Shortage of teacher training programs	1, 2	2		2, 3			
State provides PD	No	all	all	2, 4	all	1, 2	all
District provides PD	1, 2, 3	all	all	1, 3, 4		1, 2, 3, 4 AVS	
School provides PD	4, digital HS	all	all	4	1, 3	2, 4 AVS	
Teachers satisfied with PD time	1 and 2 (not satisfied)		1 — not satisfied	4		2	
Teachers satisfied with PD quality		2	2, 3, 4 yes	4	1, 3 yes	1, 2	1 yes
PD includes acad and vocational teachers		2		3	all	2 sometimes	All, state policy encourages
PD on academic standards/tests	1	all	all	4	all	2	
PD on vocational standards		2		1, 2		4 AVS	all
PD on general curric		all	3, 4			1, 2	
PD on integ. curric		2	3, 4	2, 3	1, 3	2, 3, 4 AVS	3
PD on integrated CTE programs		2		2, 3		4 AVS	3
PD on innovative teaching	1, 2	2	4			3 (district PD)	3
PD externships	3		all	2	all	1, 2 and 3 AVS, 4	

Narrative Summary

The following sections summarize the previous tables. In discussing distinctions between schools, two numbers are provided: the number of schools in the full sample (28 schools), followed in parentheses by the number of schools in the "pure" sample (13 schools). Since the number of "pure" schools is very small, the interpretations presented here must be taken as very tentative.

Integration Structure (Table C.1)

Data in this table indicate few differences. Most schools in the sample incorporate career pathways and vocational education as a sequence of courses. In the case of pathways, 14 (7) "high" schools and 11 (6) low schools have pathways, and data indicate that two additional low schools are in the planning stages. With respect to course sequencing, 12 (6) "high" schools and 13 (6) low schools sequence courses. Equal numbers of "high" and low schools have academy programs: 5 (2) high and 5 (2) low. Equal numbers of "high" and low schools have block scheduling — 8 (4); equal numbers have common planning time: 3 (2). There is a tendency for "high" schools to group career students in academic classes: 6 (2) high, 3 (1) low. "High" schools more frequently reported on an indicator that is negatively associated with integration — providing vocational education as stand-alone courses: 7 (2) high, 6 (1) low.

Integration Curriculum (Table C.2)

The schools in the sample incorporated a number of features associated with curriculum integration. Most prevalent were increasing academics in vocational courses, vertical alignment of courses, project-based learning, connections to work — for example, job shadowing, speakers in class — and work-based learning. Differences were small between high-performing and low-performing schools for all these categories (2 schools at most).

"High" schools showed more attention to academics than low: 12 (6) high, 10 (7) low (note the reversal for the "pure" sample); more connections to work: 13 (7) high, 12 (6) low; and more vertical alignment: 13 (6) high; 12 (6) low.

More prevalent activities in low schools included senior projects: 5 (2) high, 6 (4) low; project-based learning 10 (6) high and 12 (6) low; work-based learning: 13 (6) high, 14 (6) low; and obtaining credit for work-based learning: 9 (5) high and 11 (5) low.

Equal numbers of schools had school-based enterprises: 5 (1). Only one low school reported efforts to increase vocational learning in academic subjects.

Challenging Academic and Vocational Standards: Table C.3

Data in Table C.3 illustrate the influence of academic standards and tests over vocational programs. Most sites felt pressure to raise standards: 13 (7) high, 11 (6) low and were influenced by state academic standards — 11 (7) high, 14 (6) low — or tests: 12 (7) high, 11 (6) low. About equal numbers — 13 schools in each group — reported influence of industry standards in vocational programs. Vocational standards were less important — about 10 schools in each group. In about half of the schools, 7 (1) high and 6 (1) low, at least some vocational classes had to meet some academic standard or earned academic credit. In three states, meeting standards meant either that keyboarding was no longer acceptable for vocational course credit — Michigan and Ohio — or that some "applied academics" courses have been eliminated — site C2 in California. Vocational classes in "high" schools were a little more likely to earn skill certificates: 8 (5) high, 7 (2) low.

Connections to Employers and Community: Table C.4

Few sites were involved with parents (five of each type) — or career and technical student organizations, although in the complete sample, the "high" schools showed more CTSO connection than the low schools: 4 (1) high, 1 (1) low. In about equal numbers of "high" and low schools, employers participated in advisory groups (11 schools) or on schoolwide committees: 7 (4) high, 6 (3) low. Employers advised about the curriculum at about half of the schools: 7 (2) high, 7 (1) low. They also advised on industry skill needs: 9 (3) high, 8 (3) low.

The "high" schools tended to report a little more employer involvement for provision of job-shadowing or mentoring: 8 (2) high, 5 (1) low. However, the low schools had more involvement for purposes of providing work experience, arguably the more significant kind of connection for vocational students: 9 (4) high,

11 (5) low. Employers associated with "high" schools however, were a little more likely to hire students: 12 (6) high, 10 (5) low. Overall, these are not huge differences between "high" and low schools.

Connections to Postsecondary: Table C.5

Instances of postsecondary connections at the local level are somewhat sparse in Florida and North Carolina, partly reflecting the use of statewide articulation agreements, which reportedly tended to decrease local connections between high schools and institutions of higher education. Very few schools reported much collaboration with community colleges. The most frequent activities were having community college faculty on advisory boards: 3 (0) high, 5 (2) low, and sharing information on requirements and job skills: 4 high, 2 low for each. Low schools showed more indication of joint curriculum or program planning with community colleges than high schools: 2 (0) high, 5 (1) low.

Low schools tended to have more articulation agreements than "high" schools: 10 (3) high, 12 (6) low for articulation in "some" or "many" courses. Equal numbers of high and low sites (2 each) had articulation with four-year institutions. These occurred in California and Michigan only.

With respect to postsecondary connections, then, some small differences exist between high- and low-performing schools, but these seem to favor "high" schools about half the time and low schools about half the time. Overall, the schools look fairly similar except perhaps for the higher instances of articulation agreements in the low schools.

Counseling and Career Planning: Table C.6

Counseling services seem more widespread in "high" schools. More of these schools had counselors that focused on college: 6 (1), high, 4 (1) low; and counselors that advised on both college and career: 11 (6) high, 9 (5) low. "High" schools also were more likely to have dedicated career counselors: 7 (2) high, 4 (1) low.

Only 5 sites (3 high, 2 low) reported professional development for counselors that focused on career planning or counseling.

Completion of a four-year career plan, however, was a little more prevalent in the low-performing schools: 10 (4) high, 12 (5) low.

Low schools tended to review these plans more regularly: 7 (3) high, 10 (4) low. Career planning occurred before high school in similar numbers of high and low sites: 9 (4) high; 10 (4) low. The schools also engaged in numerous kinds of activities in support of career planning, including career fairs: 11 (5) high, 9 (5) low; planning activities or portfolios: 4 (1) high, 5 (2) low; and career interest inventories: 9 (5) high, 13 (6) low. Low-performing schools tended to have more opportunities for career planning within courses — for example, as a unit in a course, as a dedicated course or by means of exposure within courses to career and technical education options: 14 (8) high, 22 (11) low.

In general, these findings suggest that high-performing schools tend to provide more and more varied counseling services, while low-performing schools provide more specific activities to engage students in a career-planning process.

Technology Policy and Resources: Table C.7

Half the sites in the sample had some technology-related policy: 6 (3) high, 8 (3) low. Computer literacy was required for all students in three states and this policy was carried out in all affected schools: 9 high sites (5), 8 (4) low across all states. Nearly all sites reported using Perkins funds for technology-related purposes: 12 [7] high, 13 [6] low.

High-tech programs — for example, pre-engineering and Cisco — were not very evident in the study sites and were distributed similarly over high- and low-performing schools: 7 (3) high, 7 (2) low. In about half the sites, the study found evidence that at least some vocational courses incorporated learning technology-related skills: 10 (5) high, 12 (5) low. Similar number of "high" and low schools received advice from employers about technology-related matters: 10 (4) high, 9 (5) low. Professional development directed at technology use was fairly uncommon — this type of activity was evident in only 9 sites: 5 (2) high, 4 (0) low. Teachers were not always satisfied with the amount or quality of technology available to them — reports were provided at about 12 sites — but the pattern of satisfaction or dissatisfaction appears unrelated to whether a school is high- or low-performing.

Teacher Supply and Professional Development: Table C.8

Twelve sites in five states reported current or anticipated vocational teacher shortages: 7 (2) high, 5 (0) low. Five of these reported that shortages had affected programs: 3 (0) high, 2 (0) low. Sites in California, Michigan and Florida reported that lack of teacher training programs in the state contributed to these shortages.

State, district or school-provided professional development was fairly common, with no clear pattern of differences between schools: 11 (7) high, 9 (6) low provided by the state; 9 (3) high, 9 (3) low by the district; and 6 (4) high, 8 (3) low by the school. At 11 sites, professional development included both academic and vocational teachers: 6 (5) high, 5 (4) low.

The case studies have some limited data on topics covered in professional development courses — fewer than half the sites having any such details. These limited data suggest that professional development on academic and vocational standards is associated with "high" schools: 13 (8) high, 10 (6) low; whereas professional development on integrated curriculum or on integrated career and technical education programs is associated with low schools: 6 (3) high, 10 (4) low. Professional development on general curriculum or innovative teaching is infrequent, but similar at "high" and low schools. Other than the limited reports on different topics at high- and low-performing schools, the data do not reveal any important patterns.

Appendix D: Teacher Survey Tables

Table D.1
Percentage of Academic and Vocational Teachers Reporting Any Professional Development on Selected Topics in Last 12 Months

	Academic Teachers		Vocational Teachers			
TOPIC	n=685		n=881			
	PCT	SE	PCT	SE	test	p
Training in academic standards	86.99	1.51	83.26	1.71	2.88	0.09
Training in vocational education standards	40.56	2.38	76.99	1.70	110.44	0.00
Training in your subject content	70.47	2.04	75.62	2.08	2.99	0.08
Training in academic incorporated into vocational education	33.58	2.33	70.78	2.00	127.68	0.00
Training in vocational education incorporated into academic	37.69	2.18	52.14	2.33	20.18	0.00
Training in technology/equipment	79.19	1.81	81.35	1.71	0.79	0.38
Training in special needs students	38.37	2.36	40.85	2.27	0.70	0.40
Training in student assessment	65.41	2.28	57.06	2.58	6.41	0.01
Training in concept application/real world	46.65	2.33	55.87	2.20	8.96	0.00
Training in incorporated workplace competencies	31.53	2.31	51.90	2.20	47.52	0.00
Training in other topics	24.81	3.48	16.17	2.31	4.13	0.04

Table D.2
Percentage of Teachers in Comprehensive and Vocational Schools Reporting Any Professional Development on Selected Topics in Last 12 Months

	Comprehensive HS		Vocational HS			
TOPIC	n=1,197		n=369			
	PCT	SE	PCT	SE	test	p
Training in academic standards	86.94	1.31	72.35	5.32	7.22	0.01
Training in vocational education standards	47.02	2.03	71.09	5.14	21.24	0.00
Training in your subject content	71.77	1.72	67.24	4.95	0.72	0.40
Training in academic incorporated into vocational education	40.14	2.07	64.96	5.63	22.91	0.00
Training in vocational education incorporated into academic	39.87	1.87	57.03	4.99	8.82	0.00
Training in technology/equipment	80.27	1.54	68.07	5.29	4.12	0.04
Training in special needs students	38.44	2.09	47.33	4.93	2.85	0.09
Training in student assessment	64.06	2.01	55.84	5.05	2.13	0.15
Training in concept application/real world	48.19	2.04	56.12	4.76	2.30	0.13
Training in incorporate workplace competencies	34.84	2.08	54.80	4.69	14.45	0.00
Training in other topics	22.28	2.90	32.08	8.79	1.05	0.31

Table D.3
Percentage of Vocational Teachers in Comprehensive and Vocational Schools Reporting Any Professional Development on Selected Topics in Last 12 Months

	Vocational Teachers					
	Comprehensive HS		Vocational HS			
TOPIC	n=528		n=353			
	PCT	SE	PCT	SE	test	p
Training in academic standards	84.81	1.98	75.18	2.88	8.11	0.00
Training in vocational education standards	75.50	2.00	84.75	2.13	9.30	0.00
Training in your subject content	75.62	2.42	75.58	2.74	0.00	0.99
Training in academic incorporated into vocational education	69.77	2.28	76.06	3.85	2.07	0.15
Training in vocational education incorporated into academic	51.28	2.69	56.58	3.76	1.35	0.25
Training in technology/equipment	82.32	1.90	76.31	3.75	1.93	0.17
Training in special needs students	39.12	2.60	49.80	3.78	5.56	0.02
Training in student assessment	56.05	2.98	62.33	3.91	1.67	0.20
Training in concept application/real world	55.27	2.52	58.97	3.90	0.64	0.42
Training in incorporated workplace competencies	50.11	2.55	61.17	3.53	6.80	0.01
Training in other topics	15.50	2.71	19.19	3.25	0.76	0.38

Table D.4
Percentage of Academic and Vocational Teachers Who Report Team Teaching

	Academic Teachers		Vocational Teachers			
	n=674		n=871			
	PCT	SE	PCT	SE	test	p
Yes	9.45	1.46	12.73	1.71	2.20	0.14
No	90.55	1.46	87.27	1.71	2.20	0.14

Table D.5
Percentage of Teachers in Comprehensive and Vocational Schools Who Report Team Teaching

	Comprehensive HS		Vocational HS			
	n=1,181		n=364			
	PCT	SE	PCT	SE	test	p
Yes	9.72	1.26	18.34	4.77	2.99	0.09
No	90.28	1.26	81.66	4.77	2.99	0.09

Table D.6
Percentage of Academic and Vocational Teachers Reporting Any Participation with Postsecondary Faculty in Certain Activities

	Academic Teachers		Vocational Teachers			
TYPE OF COORDINATION	n=675		n=873			
	PCT	SE	PCT	SE	test	p
Plan overall curriculum	20.86	1.82	35.26	2.32	23.25	0.00
Plan specific lessons/units	21.07	2.17	28.90	1.88	9.20	0.00
Share tech/lab equipment	23.83	2.07	35.94	2.05	17.54	0.00
Attend joint professional development activities	30.09	2.37	47.29	2.39	27.46	0.00
Serve on joint advisory committees	15.40	1.86	33.56	2.32	32.73	0.00
Discuss student postsecondary preparation	23.36	1.98	45.61	2.41	53.76	0.00
Work on articulation agreements	14.52	1.58	41.28	2.40	82.49	0.00
Exchange employer contacts/networks	9.50	1.34	37.79	2.10	109.34	0.00
No coordination	52.29	2.43	25.69	1.96	67.08	0.00

Table D.7
Percentage of Teachers in Comprehensive and Vocational Schools Reporting Any Participation with Postsecondary Faculty in Certain Activities

	Comprehensive HS		Vocational Schools			
TYPE OF COORDINATION	n=1,179		n=369			
	PCT	SE	PCT	SE	test	p
Plan overall curriculum	23.41	1.62	32.57	3.96	4.59	0.03
Plan specific lessons/units	22.61	1.92	24.65	2.72	0.39	0.53
Share tech/lab equipment	25.84	1.79	36.15	4.03	5.06	0.03
Attend joint professional development activities	32.86	2.05	48.95	4.57	8.39	0.00
Serve on joint advisory committees	18.30	1.60	36.17	4.51	11.75	0.00
Discuss student postsecondary preparation	27.09	1.78	45.08	4.60	14.21	0.00
Work on articulation agreements	19.27	1.53	35.81	3.71	19.53	0.00
Exchange employer contacts/networks	14.09	1.27	39.99	4.38	34.01	0.00
No coordination	47.70	2.12	28.53	4.66	14.56	0.00

Table D.8
Percentage of Academic and Vocational Teachers Reporting Any Contact with Business Groups

	Academic Teachers		Vocational Teachers			
	n=681		n=882			
	PCT	SE	PCT	SE	test	p
Work on advisory committee	21.71	1.80	57.50	2.41	126.81	0.00
Have employers make presentations to students	39.03	2.24	75.49	2.12	137.76	0.00
Have employers review student work	9.58	1.37	34.39	2.06	105.21	0.00
Discuss curriculum/performance standards	16.75	1.68	49.62	2.47	111.09	0.00
Receive equip/material donations	27.72	2.17	51.57	2.49	47.74	0.00
Discuss labor market information	12.79	1.70	52.14	2.28	192.83	0.00
Discuss employee skill needs	21.92	1.89	66.82	2.19	202.78	0.00
Visit employer work site	12.50	1.50	57.68	2.11	206.39	0.00
Refer students to employers for placement	20.53	1.89	68.62	2.26	204.67	0.00
No coordination	41.88	2.37	8.11	1.28	122.17	0.00

Table D.9
Percentage of Teachers in Comprehensive and Vocational Schools Reporting Any Contact with Business Groups

	Comprehensive HS		Vocational High Schools			
	n=1,191		n=372			
	PCT	SE	PCT	SE	test	p
Work on advisory committee	27.15	1.66	68.18	6.46	75.18	0.00
Have employers make presentations to students	45.81	2.06	63.17	5.67	12.26	0.00
Have employers review student work	13.17	1.25	45.22	4.78	59.66	0.00
Discuss curriculum/performance standards	21.20	1.52	69.64	5.05	67.70	0.00
Receive equip/material donations	31.82	1.90	49.73	4.54	19.46	0.00
Discuss labor market information	18.74	1.73	63.60	5.45	73.48	0.00
Discuss employee skill needs	29.08	1.78	74.20	6.02	73.00	0.00
Visit employer work site	19.93	1.48	60.43	5.62	81.30	0.00
Refer students to employers for placement	28.34	1.73	73.51	6.33	78.46	0.00
No coordination	35.88	2.03	14.49	4.93	20.08	0.00

Table D.10
Percentage of Comprehensive and Vocational Schools Requiring Career Plans

	Comprehensive HS		Vocational HS		All Schools			
	n=220		n=119					
	PCT	SE	PCT	SE	PCT	SE	test	p
No written career plan	65.20	3.90	51.19	5.52	64.26	3.66	6.77	0.08
Career plan for all students	0.43	0.30	4.65	2.16	0.72	0.31	6.77	0.08
Career plan for some students	15.21	2.80	20.53	5.19	15.57	2.63	6.77	0.08

NOTE: School-level response determined by response given by 50 percent or more of teachers in the school.

Table D.11
Percentage of Academic and Vocational Teachers Who Report that Identified Class Has Particular Characteristics (Percentage of Classes)

	Academic Teachers		Vocational Teachers			
	n=682		n=860			
	PCT	SE	PCT	SE	test	p
Class fulfills academic requirement	83.99	1.48	41.18	2.45	187.93	0.00
Class is designated as honors	24.57	2.02	2.80	0.65	92.47	0.00
Class leads to certificate of occupational skills	4.14	0.83	37.66	2.23	138.66	0.00
Class has articulation agreement	5.63	0.98	34.39	2.25	107.70	0.00
Class is in Tech-Prep/pre-apprent/academy	4.86	1.02	35.48	2.17	146.18	0.00
Class includes paid related internship	0.62	0.30	18.22	1.74	90.90	0.00
Class includes job-shadowing	3.90	0.76	38.13	2.27	146.76	0.00

Table D.12
Percentage of Academic and Vocational Teachers Reporting "Above Average" Participation of Special Populations in Identified Classes

	Academic Teachers		Vocational Teachers			
	n=681		n=870			
	PCT	SE	PCT	SE	test	P
Students with disabilities	11.63	1.39	20.54	1.73	56.87	0.00
Limited English proficiency students	8.76	1.23	9.28	1.40	35.86	0.00
Pregnant/parenting students	5.26	1.08	8.81	1.21	14.45	0.00
Economically disadvantaged	17.77	2.00	27.17	2.26	45.31	0.00
Gifted and talented	28.91	2.11	6.12	0.86	96.40	0.00
At-risk students	17.71	1.71	31.99	2.09	70.89	0.00

Table D.13
Percentage of Teachers in Comprehensive and Vocational Schools Reporting "Above Average" Participation of Special Populations in Identified Classes

	Comprehensive HS		Vocational HS			
	n=1,188		n=363			
	PCT	SE	PCT	SE	test	P
Students with disabilities	12.68	1.17	29.43	5.07	22.40	0.00
LEP students	8.85	1.10	9.20	2.40	8.46	0.02
Pregnant/parenting students	5.65	0.91	12.73	3.70	6.26	0.05
Economically disadvantaged	19.07	1.86	32.58	4.97	29.78	0.00
Gifted and talented	25.15	1.81	4.62	1.01	43.25	0.00
At-risk students	20.11	1.50	31.59	5.34	14.70	0.00

Table D.14
Existence of Standards for Identified Classes Taught by Academic and Vocational Teachers (Percentage of Teachers Reporting)

	Academic Teachers		Vocational Teachers			
	n=680		n=862			
	PCT	SE	PCT	SE	test	p
State standards	82.18	1.82	68.09	2.28	23.40	0.00
District standards	71.05	2.41	50.91	2.39	33.76	0.00
Industry standards	3.54	0.89	24.21	1.82	107.70	0.00
School standards	51.55	2.31	48.80	2.45	0.72	0.40
Any standards	92.38	1.15	82.31	2.05	16.15	0.00

Table D.15
Percentage of Teachers Reporting Standards Influence Class a "Moderate" or "Great" Extent

	Academic Teachers		Vocational Teachers			
	n=548		n=603			
	PCT	SE	PCT	SE	test	p
State standards	77.84	2.08	72.39	2.45	3.32	0.19
District standards	79.46	2.05	74.39	2.81	4.53	0.11
Industry standards	66.86	11.97	78.47	3.65	1.28	0.53
School standards	78.07	2.40	72.50	2.73	5.74	0.06
Any standards	80.02	1.98	76.28	1.86	1.82	0.18

Table D.16
Academic and Vocational Teacher Reports of Frequency of Activities in Most Recent Identified Class (Percentage of Teachers)

	Academic Teachers						Vocational Teachers							
	n=671						n=863							
	Never		Occasionally		Frequently		Never		Occasionally		Frequently			
	PCT	SE	PCT	SE	PCT	SE	PCT	SE	PCT	SE	PCT	SE	test	p
Listen to a lecture	4.63	0.87	25.82	2.06	69.55	2.18	3.05	0.87	39.17	1.98	57.78	1.97	20.71	0.00
Write a paragraph or more	6.11	1.17	40.34	2.38	53.56	2.43	5.21	0.87	56.17	2.07	38.62	2.09	25.85	0.00
Receive homework assignment	1.33	0.52	12.52	1.47	86.15	1.49	17.10	1.73	48.96	2.22	33.94	2.06	246.82	0.00
Take test or quiz	0.43	0.25	44.02	2.21	55.55	2.22	1.70	0.50	59.42	2.02	38.89	2.05	34.9	0.00
Use computers	19.57	2.07	60.95	2.49	19.48	1.85	8.20	1.29	37.26	2.54	54.53	2.47	120.65	0.00
Use instruments/tools/equipment	62.30	2.37	14.04	1.46	23.66	2.04	27.56	2.12	7.82	1.18	64.62	2.24	148.09	0.00
Work in groups	1.04	0.41	41.09	2.28	57.87	2.26	5.46	1.06	30.17	1.95	64.36	2.02	23.69	0.00
Work on extended projects	10.24	1.28	71.29	1.92	18.47	1.43	2.29	0.58	44.73	2.21	52.98	2.22	175.57	0.00
Use commercial curriculum materials	83.75	1.68	13.34	1.51	2.92	0.79	66.77	1.99	21.83	1.74	11.40	1.24	48.23	0.00
Discuss or explore careers	25.37	1.91	69.83	2.14	4.81	0.98	2.03	0.56	74.03	1.86	23.94	1.83	157.51	0.00
Apply academic skills to job tasks	19.22	1.72	59.33	2.44	21.46	1.80	1.52	0.45	34.25	2.32	64.23	2.29	231.66	0.00
Use the Internet for research	22.03	1.97	67.34	2.22	10.62	1.37	13.93	1.54	61.45	2.34	24.62	1.95	45.51	0.00
Receive instruction through distance learning	92.58	1.08	5.82	0.91	1.60	0.54	85.67	1.47	11.70	1.35	2.62	0.71	15.37	0.00
Use technology at local college	92.54	1.08	7.46	1.08	0.00	0.00	86.48	1.45	12.38	1.43	1.13	0.43	16.04	0.00
Use technology at local business	94.68	0.97	5.32	0.97	0.00	0.00	72.14	1.79	22.76	1.65	5.11	1.05	113.61	0.00

Table D.17
Percentage of Academic and Vocational Teachers Reporting Competency Contributes to a "Great Extent" to Students' Grades in Identified Classes

	Academic Teachers		Vocational Teachers			
	n=666		n=845			
2001	PCT	SE	PCT	SE	test	p
Academic skills						
Basic math skills	30.84	1.90	32.27	2.02	0.25	0.62
Advanced math skills	15.25	1.65	6.80	1.03	15.48	0.00
Basic reading skills	58.14	2.02	44.76	2.35	17.79	0.00
Advanced reading skills	31.03	2.46	14.67	1.50	33.68	0.00
Writing skills	39.11	2.35	18.90	1.75	47.69	0.00
SCANS competencies						
Teamwork skills	22.48	1.91	46.25	2.16	65.79	0.00
Research/reference skills	16.08	1.54	13.90	1.45	1.20	0.27
Ability to use technology	19.70	1.51	45.82	2.14	87.29	0.00
SCANS foundation						
Oral communication skills	28.49	1.79	37.81	2.34	11.07	0.00
Creative thinking/problem solving	48.24	2.34	50.52	2.20	0.49	0.48
Vocational/integrated						
Job-specific skills	1.94	0.60	44.08	2.27	236.36	0.00
General employability skills	10.73	1.29	44.57	2.12	155.28	0.00
Ability to apply academic concept	7.79	1.12	33.52	2.23	96.77	0.00

Table D.18
Reported Amount of Homework Assigned in Identified Classes by Academic and Vocational Teachers (Mean Hours)

	Academic Teachers		Vocational Teachers			
	n=660		n=802			
	MEAN	SE	MEAN	SE	test	p
Mean hours of homework in last 5 school days	2.88	0.09	1.43	0.08	–12.77	0.00

Table D.19
Reported Amount of Homework Assigned in Identified Classes by Teachers in Comprehensive and Vocational Schools (Mean Hours)

	Comprehensive HS		Vocational HS			
	n=1,119		n=343			
	MEAN	SE	MEAN	SE	test	p
Mean hours of homework in last 5 school days	2.63	0.08	2.10	0.26	–1.92	0.06

Table D.20
Reported Preparation of Academic and Vocational Teachers to Teach Technology-Related Skills

	Academic Teachers		Vocational Teachers			
	n=91		n=808			
	PCT	SE	PCT	SE	test	p
Unprepared/somewhat prepared	50.23	6.32	18.54	1.65	16.78	0.00
Adequately or very well prepared	49.77	6.32	81.46	1.65	16.78	0.00

Table D.21
Percentage of Academic and Vocational Teachers Reporting "Moderate" or "Great" Input by Business Groups in Identified Career-Oriented or Vocational Classes

	Academic Teachers		Vocational Teachers			
	n=98		n=827			
	PCT	SE	PCT	SE	test	p
Review overall curriculum	4.16	1.88	25.76	2.18	55.94	0.00
Advise on curriculum materials	3.09	1.53	19.15	1.96	31.77	0.00
Advise on computer selection	5.73	2.20	10.29	1.24	6.71	0.04
Advise on instrument/equip selection	4.44	2.06	20.16	1.75	35.61	0.00
Help set class standards	4.66	2.11	19.98	1.79	35.66	0.00
Review student work	5.17	2.14	11.05	1.39	12.01	0.00
Advise on skill requirements	6.50	2.50	28.63	2.02	44.54	0.00

Table D.22
Percentage of Teachers in Comprehensive and Vocational Schools Reporting "Moderate" or "Great" Input by Business Groups in Identified Career-Oriented or Vocational Classes

	Comprehensive HS		Vocational Schools			
	n=578		n=347			
	PCT	SE	PCT	SE	test	p
Review overall curriculum	12.85	1.67	56.67	4.37	102.47	0.00
Advise on curriculum materials	9.66	1.48	41.25	3.81	101.83	0.00
Advise on computer selection	7.31	1.26	18.75	2.37	29.91	0.00
Advise on instrument/equip selection	10.08	1.44	47.89	4.10	81.37	0.00
Help set class standards	10.13	1.48	47.04	4.29	78.76	0.00
Review student work	7.26	1.29	21.52	2.63	50.53	0.00
Advise on skill requirements	15.42	1.79	60.23	4.48	95.95	0.00

Table D.23
Weighted Teacher Scales for Academic and Vocational Teachers and Classes (Mean Scores)

	Teacher Type						Class Type					
	Academic			Vocational			Academic			Vocational		
Scale	N	Mean	Std	N	Mean	Std	N	Mean	Std	N	Mean	Std
Affect of standard	683	.73	.44	867	.62	.48	612	.75	.43	803	.62	.49
Academic index	678	1.11	.55	854	.77	.70	608	1.13	.55	790	.75	.70
Technical index	677	.04	.21	860	.45	.50	608	.05	.21	797	.44	.50
Competencies overall	657	.89	.54	841	1.07	.57	585	.90	.55	767	1.07	.58
Certificate	683	.97	.18	873	.93	.26	607	.98	.14	799	.92	.27
Homework	659	1.35	.64	810	.76	.74	589	1.37	.62	740	.73	.72
Teacher quality	624	5.08	1.36	743	4.62	1.67	561	5.14	1.32	690	4.57	1.67

NOTE: All differences between academic and vocational teachers and classes are significant at the .01 level.

Table D.24
Percentage of Academic and Vocational Teachers Who Report "Moderate" or "Serious" Problems with Technology

	Academic Teachers		Vocational Teachers			
	n=93		n=818			
	PCT	SE	PCT	SE	test	p
Availability of technology problem	42.33	5.75	28.21	2.02	6.22	0.05
Availability of technology in adequate numbers	57.32	5.83	37.19	2.11	8.49	0.02
Maintenance of technology problem	42.40	5.61	38.03	2.30	0.99	0.61
Appropriateness of technology problem	44.12	5.83	29.54	2.28	6.69	0.04
Currentness of technology problem	51.15	5.74	40.66	2.44	2.43	0.30
Alignment of tech with curriculum problem	38.52	5.87	22.55	1.92	11.29	0.00
Convenient location of technology problem	45.80	6.27	26.37	2.02	8.89	0.01

Table D.25
Percentage of Teachers in Comprehensive and Vocational Schools Who Report "Moderate" or "Serious" Problems with Technology

	Comprehensive HS		Vocational HS			
	n=564		n=347			
	PCT	SE	PCT	SE	test	p
Availability of technology problem	33.61	2.56	30.41	4.49	0.85	0.65
Availability of technology in adequate numbers	45.26	2.71	37.48	4.36	2.49	0.29
Maintenance of technology problem	40.28	2.89	34.44	3.90	1.71	0.43
Appropriateness of technology problem	35.19	2.64	30.73	4.39	0.87	0.65
Currentness of technology problem	45.20	2.63	38.03	4.31	3.64	0.16
Alignment of tech with curriculum problem	29.12	2.63	21.50	3.75	3.46	0.18
Convenient location of technology problem	33.81	2.99	29.43	4.35	0.72	0.70

Table D.26
Percentage of Academic and Vocational Teachers Reporting Activity Occurs "Frequently" in Identified Class

	Academic Teachers		Vocational Teachers			
	n=671		n=863			
	PCT	SE	PCT	SE	test	p
Listen to a lecture	69.55	2.18	57.78	1.97	20.71	0.00000
Write a paragraph or more	53.56	2.43	38.62	2.09	25.85	0.00000
Receive homework assignment	86.15	1.49	33.94	2.06	246.82	0.00000
Take test or quiz	55.55	2.22	38.89	2.05	34.9	0.00000
Use computers	19.48	1.85	54.53	2.47	120.65	0.00000
Use instruments/tools/equipment	23.66	2.04	64.62	2.24	148.09	0.00000
Work in groups	57.87	2.26	64.36	2.02	23.69	0.00000
Work on extended projects	18.47	1.43	52.98	2.22	175.57	0.00000
Use commercial curriculum materials	2.92	0.79	11.40	1.24	48.23	0.00000
Discuss or explore careers	4.81	0.98	23.94	1.83	157.51	0.00000
Apply academic skills to job tasks	21.46	1.80	64.23	2.29	231.66	0.00000
Use the Internet for research	10.62	1.37	24.62	1.95	45.51	0.00000
Receive instruction through distance learning	1.60	0.54	2.62	0.71	15.37	0.00060
Use technology at local college	0.00	0.00	1.13	0.43	16.04	0.00040
Use technology at local business	0.00	0.00	5.11	1.05	113.61	0.00000

Table D.27
Percentage of Academic and Vocational Teachers Engaged in Collaboration
(Percentage Reporting Engagement in Any Collaboration)

	Academic Teachers		Vocational Teachers			
	n=689		n=888			
	PCT	SE	PCT	SE	test	p
Develop overall curriculum	61.99	2.14	65.61	2.14	1.53	0.22
Plan specific lessons/units	65.32	2.11	67.47	2.21	0.55	0.46
Discuss individual student progress	84.39	1.46	85.34	1.63	0.18	0.67
Field trips/special activities	46.51	2.03	60.64	2.13	22.32	0.00
Develop student assessments	58.51	2.35	61.40	2.17	0.92	0.34

Table D.28
Percentage of Teachers in Comprehensive and Vocational Schools Engaged in Collaboration
(Percentage Reporting Engagement in Any Collaboration)

	Comprehensive HS		Conventional HS			
	n=1,204		n=373			
	PCT	SE	PCT	SE	test	p
Develop overall curriculum	62.55	1.86	66.47	5.17	0.52	0.47
Plan specific lessons/units	65.58	1.84	69.45	5.51	0.44	0.51
Discuss individual student progress	84.43	1.24	87.60	2.93	0.92	0.34
Field trips/special activities	48.43	1.72	69.15	4.80	16.43	0.00
Develop student assessments	58.78	2.06	65.50	4.75	1.59	0.21

Table D.29
Academic and Vocational Teacher Reports of Amount of Time School Provides for Teachers to Work Together (Percentage of Teachers)

	Academic Teachers		Vocational Teachers			
	n=673		n=870			
	PCT	SE	PCT	SE	test	p
Not applicable	16.95	1.62	15.45	1.37	10.42	0.07
No time provided	61.16	2.21	60.66	2.25		
About 30 minutes	7.08	1.46	4.76	0.77		
One hour	5.04	0.89	9.79	1.36		
Two hours	3.24	0.82	3.12	0.71		
Three or more hours	6.53	1.07	6.22	1.09		

Table D.30
Reports of Amount of Time school Provides for Teachers in Comprehensive and Vocational Schools to Work Together (Percentage of Teachers)

	Comprehensive HS		Conventional HS			
	n=1,176		N=367			
	PCT	SE	PCT	SE	test	p
Not applicable	16.73	1.42	14.87	3.40	9.08	0.11
No time provided	61.64	1.98	50.08	4.79		
About 30 minutes	6.26	1.21	12.95	3.18		
One hour	5.97	0.81	7.13	1.42		
Two hours	3.09	0.69	5.55	2.76		
Three or more hours	6.31	0.95	9.43	2.96		

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