

Improving Performance on Perkins III Core Indicators: Summary of Research on Causes and Improvement Strategies

Distribution of this report is by the
National Dissemination Center for Career and Technical Education
The Ohio State University

This report and related information are available at www.nccte.com.
Additional printed, bound copies of the report are available from:

National Dissemination Center for Career and Technical Education
Product Sales Office
The Ohio State University
1900 Kenny Road
Columbus, Ohio 43210-1090
800-678-6011 ext. 24277
Fax: 614-688-3258

**IMPROVING PERFORMANCE ON PERKINS III CORE INDICATORS:
SUMMARY OF RESEARCH ON CAUSES AND IMPROVEMENT STRATEGIES**

Robert Sheets
Mimi Lufkin
David Stevens, Steve Klein, Rajika Bhandari

March 2003

Funding Information

Project Title: National Dissemination Center for
Career and Technical Education
Grant Number: V051A990004
Grantee: The Ohio State University
National Dissemination Center for Career and Technical Education
1900 Kenny Road
Columbus, Ohio 43210

Director: Floyd L. McKinney
Percent of Total Grant Financed
by Federal Money: 100%

Act under which
Funds Administered: Carl D. Perkins Vocational and Technical Education Act of 1998
P. L. 105-332

Source of Grant: Office of Vocational and Adult Education
U. S. Department of Education
Washington, D.C. 20202

Disclaimer: The work reported herein was supported under the National Dissemination Center for Career and Technical Education, PR/Award (No. VO51A990004) and/or under the National Research Center for Career and Technical Education, PR/Award (No. VO51A990006), as administered by the Office of Vocational and Adult Education, U.S. Department of Education.

However, the contents do not necessarily represent the positions or policies of the Office of Vocational and Adult Education or the U.S. Department of Education, and you should not assume endorsement the Federal Government.

Discrimination: Title VI of the Civil Rights Act of 1964 states: “No person in the United States shall, on the ground of race, color, or national origin, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving Federal financial assistance.” Title IX of the Education Amendment of 1972 states: “No person in the United States shall, on the basis of sex, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any education program or activity receiving Federal financial assistance.” Therefore, the National Dissemination Center for Career and Technical Education and the National Research Center for Career and Technical Education project, like every program or activity receiving financial assistance from the U.S. Department of Education, must be operated in compliance with these laws.

TABLE OF CONTENTS

List of Figures..... v

List of Tables vi

Introduction and Overview..... 1

 The 5-Step Improvement Process 1

 Using Research in Root-Cause Analysis (Step 2) and Strategy Development (Steps 3 and 4)..... 2

 Using the Research Summary: A Framework for Ongoing Analysis 4

Chapter 1. Perkins III Core Indicators: Secondary Academic Attainment (1S1) and Vocational Skill Attainment (1S2) 7

 References.....16

Chapter 2. Perkins III Core Indicators: Postsecondary Academic Attainment (1P1) and Vocational Skill Attainment (1P2)19

 References.....25

Chapter 3. Perkins III Core Indicator: Secondary Completion (2S1).....29

 References.....36

Chapter 4. Perkins III Core Indicator: Postsecondary Degree or Credential (2P1).....39

 References.....45

Chapter 5. Perkins III Core Indicators: Secondary Placement (3S1), Postsecondary Placement and Retention (3P1 & 3P2).....49

 References.....57

Chapter 6. Perkins III Core Indicators: Participation in Secondary and Postsecondary Non-Traditional Programs (4S1 and 4P1)61

 References.....73

List of Figures

Figure 1. Example Strategies and Models for Secondary Academic Attainment 4

List of Tables

Table 1: Root and Indirect Causes for Secondary Academic (1S1) and Vocational Skill (1S2) Attainment..... 7

Table 2: Causes Outside Control for Secondary Academic (1S1) and Vocational Skill (1S2) Attainment12

Table 3: Improvement Strategies for Secondary Academic (1S1) and Vocational Skill (1S2) Attainment.....13

Table 4: Root and Indirect Causes for Postsecondary Attainment (1P1 and 1P2)19

Table 5: Causes Outside Control for Postsecondary Attainment (1P1/1P2).....23

Table 6: Improvement Strategies for Postsecondary Attainment (1P1 and 1P2)24

Table 7: Root and Indirect Causes for Secondary Completion (2S1).....29

Table 8: Causes Outside Control for Secondary Completion (2S1).....32

Table 9: Improvement Strategies for Secondary Completion (2S1).....33

Table 10: Root and Indirect Causes for Postsecondary Completion (2P1).....39

Table 11: Causes Outside Control for Postsecondary Completion (2P1).....42

Table 12: Improvement Strategies for Postsecondary Completion (2P1).....43

Table 13: Root and Indirect Causes for Transition (3S1, 3P1, 3P2)49

Table 14: Causes Outside Control for Transition (3S1, 3P1, and 3P2)52

Table 15: Improvement Strategies for Transition (3S1, 3P1, and 3P2).....54

Table 16: Root and Indirect Causes for Nontraditional Participation (4S1 and 4P1).....61

Table 17: Causes Outside Control for Nontraditional Participation (4S1 and 4P1).....63

Table 18: Improvement Strategies for Nontraditional Participation (4S1 and 4P1).....65

Table 19: Root and Indirect Causes for Nontraditional Completion (4S2 and 4P2).....68

Table 20: Causes Outside Control for Nontraditional Completion (4S2 and 4P2)69

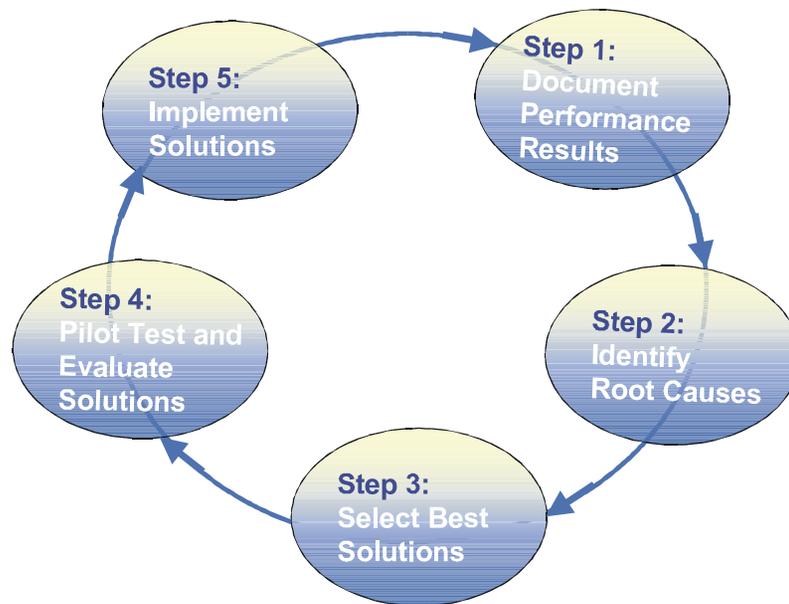
Table 21: Improvement Strategies for Nontraditional Completion (4S2 and 4P2).....70

INTRODUCTION AND OVERVIEW

The following summary of current research is designed to help state education agencies, schools, and colleges use research to improve performance on the Perkins III core indicators. It is one of the resources developed by the U.S. Department of Education, Office of Vocational and Adult Education (OVAE), for state education agencies, schools, and colleges as part of the Program Quality Initiative (PQI)—an initiative to assist states in improving state and local performance.

The 5-Step Improvement Process

The PQI uses a generic 5-step improvement process that is based on practical, yet rigorous, methods and tools to guide state and local improvement efforts. This process is presented and explained in a guide entitled *Improving Performance: A Five-Step Process*.



Step 1: Document Performance Results. The first step in the process is to describe state and school/college performance on the core indicators by comparing performance levels among schools/colleges, student populations, and programs over time. This step uses summary statistics and basic graphs and charts to document performance and identify improvement priorities.

Step 2: Identify Root Causes. The second step is to analyze performance data and use additional information and methods to determine the most important and most direct causes of performance gaps that can be addressed by improvement strategies and specific solutions. This step encourages states to use multiple methods to identify and evaluate potential causes, and then to select a few critical root causes as the focus of improvement efforts.

Step 3: Select Best Solutions. The third step is to identify and evaluate potential solutions to performance problems, including both improvement strategies and program models, by reviewing and evaluating the underlying logic of these solutions and the empirical evidence of their effectiveness in achieving performance results.

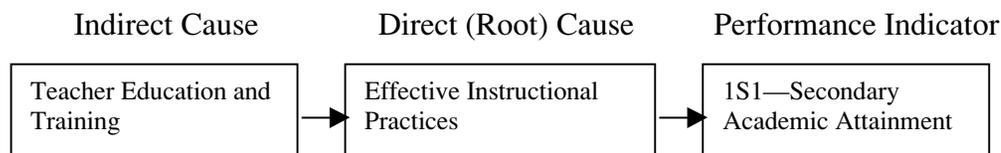
Step 4: Pilot Test and Evaluate Solutions. The fourth step is to conduct pilot testing and evaluation of solutions. This step presents practical, yet rigorous, methods and tools for evaluating solutions before full implementation at the state or institutional levels.

Step 5: Implement Solutions. The fifth step is to implement fully tested solutions based on implementation plans that measure the implementation of the solution and evaluate the success of the solution in reaching the expected performance results. This step also addresses how to use evaluation results to plan the next steps in state and local improvement efforts.

Using Research in Root-Cause Analysis (Step 2) and Strategy Development (Steps 3 and 4)

The 5-step process promotes the use of research evidence to identify root causes of performance problems (Step 2) and choose and evaluate solutions, including improvement strategies and model practices (Steps 3 and 4).

Research Applications in Step 2: Identifying Root and Indirect Causes and Causes Outside Control. As described in the guide, *Improving Performance: A 5-Step Process*, program improvement is, in part, a search for answers to a very basic question: what causes poor performance? Root causes are those conditions or factors that directly cause or permit a performance gap to occur. They are direct, not indirect, causes. For example, effective instructional practices are a direct cause of student academic attainment in secondary schools (Core Indicator 1S1—Secondary Academic Attainment). In contrast, teacher education and training is an indirect cause because it has an effect on student achievement only to the extent that the training results in improved instructional practices in the classroom, which, in turn, affect academic attainment.



Indirect causes can be either within the control of schools and colleges or outside the control of schools and colleges. For example, teacher education and training is an indirect cause of academic attainment, but schools and colleges can take actions to increase teacher education and training. However, another indirect cause may be overall school resources. Although federal and state governments and local taxing districts can increase school and college funding, this may be considered an indirect cause outside the control of school and college staff for the purposes of improvement planning.

Determining root causes is a search for the most direct and highest impact causes of performance gaps on core indicators that are within the control of schools and colleges. This search should employ a systematic evidence-based process—one that allows for the formulation and testing of theories or hypotheses about the underlying cause–effect relationships for each core performance indicator. It should draw on current research and evaluation, and use multiple methods and data sources, to test specific hypotheses. Rarely are performance problems caused by a single factor; rather, they are caused by a combination of root causes, and indirect causes, some of which are beyond the immediate control of schools and colleges.

There are many different approaches to identifying root causes, but most approaches involve 3 basic phases: (1) identify potential causes, (2) analyze and evaluate potential causes, and (3) select a critical few root causes. These 3 phases should be based on multiple methods to develop lists, so that you can take advantage of multiple sources of information and multiple perspectives from students, faculty, and other internal and external stakeholders. These methods should include a review of research, as well as student and stakeholder focus groups, surveys, data analysis, and peer benchmarking.

The review of research literature is most critical in the first 2 phases—identifying potential causes and evaluating potential causes. A comprehensive research review will identify potential causes that are not immediately apparent to practitioners, and can help provide the framework for designing surveys and data analysis. This analysis and evaluation of potential causes should use a comprehensive set of evaluation criteria, including:

- Theory. Is there a clear and compelling theory or rationale for the cause?
- Evidence. Is there strong and compelling evidence that this is a major cause of performance problems? Is there evidence to suggest that it is a major cause at your school or college or at peer institutions?
- Root or Indirect Cause. Is this cause a direct cause of performance gaps, or is it an indirect cause that has an impact only through another related cause?

The research review provides the starting point for determining whether there are strong theory and evidence for each of the potential causes for the core indicators.

Research Applications in Step 3: Selecting Potential Solutions on Strong Theory and Evidence. As described in the guide, *Improving Performance: A Five-Step Process*, the search for solutions should involve multiple methods, including the review of current research on improvement strategies and model practices. This effort should first identify the potential improvement strategies that can impact the root and indirect causes in your cause–effect model from Step 2. It then should identify specific school or college model practices that are based on these strategies. This can be illustrated by the example in Figure 1 for Core Indicator 1S1—Secondary Academic Attainment. In addressing the root cause of “time on task,” one possible improvement strategy could be to increase time students are engaged in learning in school by changing class scheduling. This strategy could use a wide variety of scheduling approaches including one or more variations of block scheduling.

Root Cause	Improvement Strategy	Model (Model Practices)
Time on Task	School Class Scheduling	Block Scheduling Model 1 Block Scheduling Model 2

Figure 1. Example Strategies and Models for Secondary Academic Attainment.

Using a comprehensive research review helps state education agencies, schools, and colleges stretch their thinking, and helps develop more creative solutions. It also provides the basis for a systematic analysis of alternative solutions based on two questions:

- Theory. Is the solution based on sound theory of root causes (Step 2), and how does the solution address these causes?
- Evidence. Has the solution worked; that is, has it produced results under similar or comparable circumstances to yours, and is the evidence strong and compelling.?

Using the Research Summary: A Framework for Ongoing Analysis

This research summary is designed to provide states, schools, and colleges with a starting point in using research to improve performance. It provides an organizing framework to manage and integrate research literature, as well as institutional research and data analysis. This summary does not represent a comprehensive review and analysis of all available research. It only provides a representative cross section of the types of research that can inform improvement efforts. It also does not evaluate the quality of the research evidence. The research evidence included in this summary ranges from qualitative case studies to experimental research with varying degrees of scientific rigor. This summary provides a framework for others to begin their own reviews of the research literature to guide their own improvement efforts.

The following tables and references are designed to illustrate how research can be used to develop and evaluate root causes and solutions. This report provides three tables for each set of Perkins III Core Indicators.

Root and Indirect Causes. This table presents the root causes and indirect causes, along with brief descriptions and explanations of each cause and related research evidence. In some cases, there is no research evidence to support theories of cause–effect relationships.

Causes Outside Control. This table presents other causes that are assumed to be outside the control of states agencies, schools, and colleges, and should be considered constraints or factors for developing and evaluating improvement strategies and model practices. This table also presents related research evidence. Again, in some cases, no research evidence is available.

Improvement Strategies. This table presents potential improvement strategies for one or more of the root causes. This table describes the theory and evidence for the improvement strategy and one or more models and the evidence that supports the strategy, if available.

These three tables are supported by a list of references from the research literature.

Chapter 1. Perkins III Core Indicators: Secondary Academic Attainment (1S1) and vocational Skill Attainment (1S2)

Table 1
Root and Indirect Causes for Secondary Academic (1S1) and Vocational Skill (1S2) Attainment

Root (Direct) Causes	What the Literature Says
Student motivation and engagement	<p><u>Theory</u>: Students with strong commitment to and involvement in learning and strong motivation to demonstrate achievement will take more challenging courses, get higher grades, and perform better on national and state assessments. Student motivation can be either intrinsic (for its own sake) or extrinsic (to achieve or accomplish something else of value).</p> <p><u>Evidence</u>: Research has shown consistent effects of student motivation and engagement (e.g., lack of student interest in learning) on academic achievement across multiple school contexts and student populations (Walberg, 1992; Gollub, Bertenthal, Labov, & Curtis, 2002). No evidence was found for vocational attainment.</p> <p><u>Indirect Causes</u>: Student motivation and engagement is related to the following indirect causes:</p> <ul style="list-style-type: none"> ❑ <u>Goal clarity and relevance</u>. Students who develop goals and plans for high school and beyond, and see the relevance of academics to their career and educational goals will be more motivated to learn and demonstrate achievement. Research suggests that the more time vocational students are involved with teachers and counselors to develop and discuss their plans, the higher their academic performance (Kaufman, Bradby, & Teitelbaum, 2000). Students are more motivated to learn and will persist in the face of difficulty when they find learning personally interesting and meaningful, or directly relevant to something that they value (Gollub et al., 2002). ❑ <u>Career and further education incentives</u>. Students who receive improved career prospects for demonstrated achievement, and advanced placement in further education or employment will be more motivated and engaged in learning, and have more incentives to demonstrate achievement. Students will exert more effort in school if they see a clear connection between achievement in school and access to further education or employment opportunities (Rosenbaum, 1999). ❑ <u>Perceived chances for success</u>. Students who have strong internal control orientations are more likely to assume that they will achieve success by working hard, and will demonstrate higher levels of effort and engagement. Student control orientation has been shown in some research to be more important than student self-esteem (Ross & Broh, 2000). ❑ <u>Peer and school culture</u>. The norms and morale of peer groups within classrooms and schools and outside schools that discourage or do not promote effort and enthusiasm for learning have impacts on motivation and engagement (Walberg, 1992; Bishop, 2001; Steinberg, Brown, and Dornbusch, 1996).

Root (Direct) Causes	What the Literature Says
	<ul style="list-style-type: none"> <li data-bbox="506 258 1856 347">❑ <u>Rewards and consequences for passing external exams.</u> Moderate- to high-stakes external examinations that have real consequences for students and schools have an impact on academic achievement because they clarify goals, raise expectations, and motivate both students and teachers to meet academic standards (Bishop, 2001). <li data-bbox="506 358 1824 477">❑ <u>School and teacher expectations.</u> Student motivation and engagement are increased, and students perform better when schools and teachers provide clear expectations that students will meet academic standards. Students respond by showing more engagement and effort, and work harder to meet school and teacher expectations (Visher, Emanuel, & Teitelbaum, 1999). <li data-bbox="506 488 1850 639">❑ <u>School and class size.</u> School and class size, and the implementation of smaller learning communities can have an indirect affect on achievement (Visher et al., 1999). It can have an effect on instructional practices and student achievement—especially in the lower grades in schools with children from families with lower socioeconomic status (Grissmer, Flanagan, Dawata, & Williamson, 2000). Lower school and class sizes provide the context for stronger student–teacher relations and more student-centered, personalized instructional strategies associated with higher academic achievement. <li data-bbox="506 651 1856 802">❑ <u>Participation in extracurricular activities.</u> Students who are actively engaged in extracurricular activities that support or reinforce academic achievement and build stronger identification and commitment to school have higher levels of academic achievement. Research has found consistent effects of participating in sports on academic achievement, but has not found effects from other activities, including vocational clubs (Broh, 2002). Other research has found the largest impacts on disadvantaged students (Marsh & Kleitman, 2002). <li data-bbox="506 813 1856 964">❑ <u>Safety and personal/social needs.</u> Students are more motivated to learn and demonstrate achievement when their more primary needs are met for safety and social integration within the school and larger family and community environments. Schools that provide a safe and secure environment with strong personal relationships between students and staff will provide the necessary foundation for students to become engaged in learning. No research was found on the direct effects of need fulfillment on student engagement, and academic and vocational skill attainment. <li data-bbox="506 976 1845 1127">❑ <u>Parental involvement.</u> Although parental involvement has the strongest effects on student achievement at the primary and middle-school levels, parental involvement in the form of parents talking about college and attending college-planning workshops is associated with higher student grades and higher test scores (Simon, 2001). The most important aspect of parental involvement is the communication and reinforcement of educational aspirations. This aspect is closely linked with student motivation and academic achievement for students from all ethnic and racial backgrounds (Fan, 2001). <li data-bbox="506 1138 1829 1224">❑ <u>Risk behaviors.</u> Schools that successfully address major risk behaviors of at-risk students (e.g., drugs, teenage pregnancy) can have a major effect on student engagement and achievement (Valverde, Scribner, & Source, 2001; Conchas, 2002). Students with higher levels of drug use are less engaged and have lower levels of academic achievement (Jeynes, 2002). <li data-bbox="506 1235 1835 1321">❑ <u>Work and family commitments.</u> Students who work a large number of hours per week during the school year and/or have major family work commitments and related responsibilities are less engaged in school and have lower levels of academic achievement (Holloway, 2001; Singh, 1998; Oetinger, 1999; Hannah & Baum, 2002).
<p>Time on task</p>	<p><u>Theory:</u> Students who spend more time engaged in learning (e.g., more or longer courses and class sessions, more learning time within existing classes, homework) will have higher levels of academic achievement.</p>

Root (Direct) Causes	What the Literature Says
	<p>Evidence: A considerable body of research has shown that time on task has large and consistent effects on academic achievement (Walberg, 1992). In general, students who are engaged in more coursework in core subject areas such as language arts, mathematics, and science have higher levels of academic achievement (Kaufman et al., 2000). Students who participate in more instructional time and have higher levels of attendance have higher levels of achievement. Research has shown that high-performing schools use more of scheduled class time for actual learning than do low-performing schools (Bishop, 2002). Research also has shown that high-quality, work-based learning can increase SCANS skills (Stone & Josian, 2000).</p> <p>Indirect Causes: Time on task is affected by the following indirect causes:</p> <ul style="list-style-type: none"> ❑ Class scheduling. Alternative class scheduling, such as block scheduling, has the potential to increase academic achievement by providing students with more concentrated time on task for specific subjects. However, research has failed to find any significant effects of block scheduling on academic achievement (Pliska, Hackman, & Source, 2001). ❑ Attendance. Attendance has a major impact on time on task and student academic achievement (Walberg, 1992). ❑ Homework. Schools can extend time on task by requiring students to do homework. One major potential effect of parental involvement on academic achievement is direct involvement in and enforcement of homework (Simon, 2001). ❑ Tutoring and support services. Schools can increase time on task for students by providing additional tutoring and support services. ❑ Classroom management. Research has shown that high-performing schools have more concentrated learning per unit of time than lower-performing schools (Bishop, 2002). ❑ Work and family commitments. Students who work a large number of hours per week during the school year and/or have major family work commitments and related responsibilities are less engaged, and spend less time during school work, attend school less, and have lower levels of academic achievement (Holloway, 2001; Singh, 1998; Oetinger, 1999; Hannah & Baum, 2002). However, students engaging in high-quality, work-based learning can develop SCAN skills related to their career and technical education programs (Stone & Josian, 2000).
<p>Instructional practices</p>	<p>Theory: Students who receive high-quality instruction will be more motivated and engaged in their own learning, and will receive the type of instruction and overall support necessary for them to take more rigorous classes, achieve higher grades, and perform better on state academic assessments.</p> <p>Evidence: Research consistently shows that the instructional practices of teachers in classrooms, as measured by indirect quality indicators (e.g., experience, qualifications, ability), have large and consistent effects on academic achievement (Whitehurst, 2002). However, the research on specific instructional practices has shown inconsistent and ambiguous results. The research evidence supports the general principle of personalized or student-centered instruction, with different instructional strategies and practices used, depending on the learning objective, classroom context, and student learning styles and needs. However, researchers have identified some general instructional practices that are supported by research evidence for a wide variety of objectives, contexts, and student populations (Gollub et al., 2002; Walberg, 1993). In addition, research has suggested some general classroom characteristics and practices (Cotton, 1995). No evidence was found for vocational attainment.</p>

Root (Direct) Causes	What the Literature Says
	<p><u>Indirect Causes:</u> Effective instructional practices are related to the following:</p> <ul style="list-style-type: none"> ❑ <u>Teacher academic ability and subject knowledge.</u> The general academic ability of teachers, especially verbal ability, as measured by ACT and SAT scores, and the subject knowledge of teachers, as measured by direct assessments or whether teachers are teaching subjects they have been trained to teach (i.e., in-field teaching) are the most consistent factors influencing the quality of instructional practices and student learning—especially at the secondary level (Bishop, 2002; Ehrenberg & Brewer, 1994; Monk, 1994). There is no research evidence to support the widely held belief that teachers with master’s or other advanced degrees in education, or higher salaries will produce higher student achievement (Whitehurst, 2002; Grissmer et al., 2001). ❑ <u>Focused professional development.</u> Although there is a large and growing body of research on professional development, there is very little evidence that professional development, in general, has a major impact on instructional practices and student achievement. However, some research has shown that highly focused and intensive professional development tied specifically to the standards, content, and curriculum of a specific subject area, such as math or science, improves teacher and student performance (Wiley & Yoon, 1995). ❑ <u>School and class size.</u> Research has shown that school and class size can have an effect on instructional practices and student achievement—especially in the lower grades in schools with children from families with lower socioeconomic status (Grissmer et al., 2000). Lower school and class sizes provide a smaller learning community context for stronger student–teacher relations and more student-centered, personalized instructional strategies associated with higher academic achievement (Visher et al., 1999). ❑ <u>Teacher resources.</u> Schools with teachers who report that they have the necessary resources and time to provide quality instruction have higher levels of student academic achievement (Grissmer et al., 2000). ❑ <u>Teacher planning and cooperation.</u> Schools that have high levels of joint teacher planning and cooperation to support student achievement have higher levels of student achievement. Vocational students who perceive that their academic and vocational teachers are working together to support student academic achievement have higher levels of academic achievement (Kaufman et al., 2000).
<p>Curriculum alignment</p>	<p><u>Theory:</u> Schools that directly align their internal assessment and grading systems and curriculum to state standards will have higher levels of student academic achievement (Tienken, 2001). The degree of curriculum alignment varies by school and subject area. Differences in school curriculum alignment may explain differences between low- and high-performing schools with similar characteristics (Whitehurst, 2002). School and curriculum alignment to industry standards has been considered a major factor in promoting student attainment of vocational and technical skills in national industry certification initiatives (Lewis, Gill, & Lundquist, 1996).</p> <p><u>Evidence:</u> No consistent research evidence was found linking curriculum alignment to academic achievement. However, some research suggests that assessment and curriculum alignment may result in higher levels of achievement on state assessments (Baenen & Dulaney, 2000). No evidence was found for vocational attainment. Some research also suggests that school and program alignment to national certification requirements (e.g., Automotive Service Excellence program certification) will increase student achievement on vocational and technical skill assessments (Lewis et al., 1996).</p>

Root (Direct) Causes	What the Literature Says
Prior learning	<p><u>Theory</u>: Students learn by connecting learning to prior learning (Gollub et al., 2002). Students with higher levels of academic achievement have the skills and confidence to build on their previous academic success.</p> <p><u>Evidence</u>: Prior learning is a consistent predictor of future academic achievement in the form of test scores and grades (Walberg, 1992; Grissmer et al., 2001).</p>
Barriers to learning	<p><u>Theory</u>: Students who face learning disabilities and language problems (e.g., limited-English-speaking students) will have more difficulty in learning than students without learning barriers.</p> <p><u>Evidence</u>: Research has found consistent effects of learning disabilities (Gersten & Fuchs, 2001; Maccini, McNoughton, & Ruhl, 1999) and language problems (Rumberger & Larson, 1998) on student academic achievement.</p>

Table 2
Causes Outside Control for Secondary Academic (IS1) and Vocational Skill (IS2) Attainment

Causes Outside Control	What the Literature Says
<p>Family demographic characteristics</p>	<p><u>Theory</u>: Family demographic characteristics determine the amount of human (parental education), financial (household income), and social (family structure and relationships) capital that can support higher achievement. In particular, parents with higher education levels and higher incomes are more likely to promote the value and importance of academic achievement, and be able to provide direct learning assistance to students. Differences in academic and vocational skill attainment between minority and non-minority populations are explained in research, to a large extent, by socioeconomic differences.</p> <p><u>Evidence</u>: Research has consistently demonstrated that parents’ education levels have the largest and most consistent effect on student academic attainment. Students with one or two college-educated parents have higher levels of academic achievement than other students (Grissmer, Kirby, Berends, & Williamson, 1999; Grissmer et al., 2000). Research shows significant, but lower, levels of impact of family income—with students from middle- and upper-income families performing better than students from poor families. Although family size and mother’s age at student’s birth have moderate effects on student achievement, single-parent status of students did not have a significant effect on academic attainment (Grissmer et al., 2000). No evidence was found on the effects on secondary vocational skill attainment.</p>
<p>School expenditure levels</p>	<p><u>Theory</u>: Schools with higher state and local expenditures per pupil will have more resources available to directly support learning, and will have higher levels of academic achievement and vocational skill attainment.</p> <p><u>Evidence</u>: Research shows small-to-moderate effects of per-pupil expenditures on student academic attainment (Grissmer et al., 2001). No evidence was found on vocational skill attainment.</p>
<p>Career and further education opportunities</p>	<p><u>Theory</u>: Students with better and more diverse career and further-education opportunities in their communities will be more motivated to learn and demonstrate attainment of vocational and technical skills. Students will exert more effort in school if they see a clear connection between achievement in school and access to further education or employment opportunities (Rosenbaum, 1999).</p> <p><u>Evidence</u>: No research was found on the impact of perceived or actual opportunities on academic or vocational skill attainment.</p>

Table 3
Improvement Strategies for Secondary Academic (IS1) and Vocational Skill (IS2) Attainment

Improvement Strategy	Root Causes Addressed	What the Literature Says
<p>Academic integration</p>	<ul style="list-style-type: none"> <input type="checkbox"/> Student motivation and engagement <input type="checkbox"/> Time on task <input type="checkbox"/> Instructional practices 	<p><u>Theory and Models:</u> Schools can increase the percentage of vocational concentrators who take a rigorous core academic curriculum in high school and increase the degree that academic and vocational instructors integrate academic and vocational curricula.</p> <p><u>Evidence:</u> Although research shows that students taking more rigorous academic courses have higher levels of academic achievement, the research on applied academics is mixed (Field, 1999; Visher et al., 1999). No research was found to support the effects of academic–vocational curriculum integration on either academic or vocational skill attainment. However, research suggests that vocational students who perceive that their academic and vocational teachers are working together to support student academic achievement have higher levels of academic achievement (Kaufman et al., 2000).</p>
<p>Career incentives and articulation/advanced placement</p>	<ul style="list-style-type: none"> <input type="checkbox"/> Student motivation and engagement 	<p><u>Theory and Models:</u> Schools can increase academic and vocational skill attainment by providing students with career incentives (e.g., work-based learning opportunities, job placement) and advanced placement opportunities that reduce the necessary coursework to achieve a postsecondary certificate or degree. There are many different models, including Advanced Placement and Tech Prep.</p> <p><u>Evidence:</u> There is no evidence that career and further education incentives increase academic or vocational skill attainment</p>
<p>Career/academic guidance and mentoring</p>	<ul style="list-style-type: none"> <input type="checkbox"/> Student motivation and engagement 	<p><u>Theory and Models:</u> Students who have clear career and educational goals, and see the relevance of academics to these goals are more likely to be motivated and engaged to learn and demonstrate achievement. In addition, students who have close and direct contact with teachers and adult career and educational mentors who reinforce the importance of academics will be more motivated and engaged. There are many models of integrated career and academic counseling and adult mentoring. The focus on career and academic guidance and counseling is a major principle in High Schools That Work (Kaufman et al., 2000).</p>

Improving Performance on Perkins III Core Indicators

Improvement Strategy	Root Causes Addressed	What the Literature Says
		<p><u>Evidence:</u> No research was found that provided evidence on the effects of career and academic counseling and mentoring. However, research suggests that students who report that they have regular contact with their teachers and others about career and educational goals have higher levels of academic achievement (Kaufman et al., 2000).</p>
<p>Participation in student vocational organizations</p>	<ul style="list-style-type: none"> <input type="checkbox"/> Student motivation and engagement <input type="checkbox"/> Time on task 	<p><u>Theory and Models:</u> Students who are actively engaged in extracurricular activities that support or reinforce academic and vocational/technical skill achievement have higher levels of academic achievement. Vocational student organizations reinforce student motivation through stronger teacher and industry interaction, and provide more time to learn and practice skills in extracurricular activities</p> <p><u>Evidence:</u> Research has found consistent positive effects of participating in sports on academic achievement, but has not found effects from other activities, including vocational student organizations (Broh, 2002). No research was found on the effects of student organization participation on vocational skill attainment.</p>
<p>Intensive and early academic intervention</p>	<ul style="list-style-type: none"> <input type="checkbox"/> Prior learning <input type="checkbox"/> Barriers to learning <input type="checkbox"/> Time on task 	<p><u>Theory and Models:</u> Students who receive intensive and early academic tutoring and extra class time to develop their academic skills to-grade-level, and who address learning barriers (e.g., English as a Second Language problems) before concentrated participation in vocational education will achieve higher levels of academic achievement. There are some emerging models of intensive academic intervention in career-focused programs, including models that emphasize applied academics in the context of a career area, similar to what is done in freshman career academies.</p> <p><u>Evidence:</u> Although research supports the general strategy of intensive and early remediation, no evidence was found on this strategy for vocational education students.</p>
<p>External academic examinations, and industry or professional assessments and certifications</p>	<ul style="list-style-type: none"> <input type="checkbox"/> Student motivation and engagement <input type="checkbox"/> Instructional practices <input type="checkbox"/> Curriculum alignment 	<p><u>Theory and Models:</u> Moderate- to high-stakes external examinations that have real consequences for students and schools have been shown to have an impact on academic achievement because they clarify goals, raise expectations, and motivate both students and teachers to meet academic standards (Bishop, 2002). Similar effects should be expected from external industry/professional assessments and certifications. Many states are using these industry and professional certifications to improve the quality and effectiveness of career and technical programs. Many times, these certifications provide program improvement and professional development opportunities and requirements (e.g., program approval, teacher certification) that can improve instructional practices and curriculum alignment.</p>

Improvement Strategy	Root Causes Addressed	What the Literature Says
		<p><u>Evidence</u>: Although research has shown positive impacts of external academic assessments on academic achievement (Bishop, 2002), there is no research evidence on the impact of external industry/professional assessments and certifications on vocational skill attainment.</p>
<p>Focused professional development</p>	<ul style="list-style-type: none"> ❑ Instructional practices ❑ Curriculum alignment 	<p><u>Theory and Models</u>: Research in academic achievement has shown that focused professional development on standards and curriculum can have impacts on student achievement (Wiley & Yoon, 1995). It would seem logical to assume that similar effects should be achieved by focused professional development on vocational and technical skill attainment.</p> <p><u>Evidence</u>: There is no research evidence that professional development has an impact on vocational and technical skill attainment.</p>

References

- Baenen, N., & Dulaney, C. (2000). Can School District Classroom-Based Assessment Improve Performance on State Tests? ERIC ED445091.
- Bishop, J. (2001). What Should Be the Federal Role in Supporting and Shaping Development of State Accountability Systems for Secondary School Achievement? Report prepared for the Office of Vocational and Adult Education, U.S. Department of Education.
- Broh, B. (2002). Linking Extracurricular Programming to Academic Achievement: Who Benefits and Why? *Sociology of Education* 75 (1), 69–91.
- Conchas, G. (2002). Structuring Failure and Success: Understanding the Variability in Latino School Engagement. *Harvard Educational Review* 71(3), 475–504.
- Ehrenberg, R., & Brewer, D. (1994). Do School and Teacher Characteristics Matter? Evidence from High School and Beyond. *Economics of Education Review*, 14, 1–23.
- Fan, X. (2001). Parental Involvement and Students' Academic Achievement: A Growth Modeling Analysis. *The Journal of Experimental Education*, 70(1), 27–61.
- Gersten, R., & Fuchs, L. (2001). Teaching Reading Comprehension Strategies to Students with Learning Disabilities: A Review of the Literature. *Review of Educational Research*, 71(2), 279–320.
- Gollub, J., Bertenthal, M., Labov, J., & Curtis, P. (2002). Learning and Understanding: Improving Advanced Study of U.S. High Schools. Washington, D.C.: National Research Council.
- Grissmer, D., Flanagan, A., Dawata, J., & Williamson, S. (2000). Improving Student Achievement: What NAEP Test Scores Tell Us. Santa Monica, CA: Rand.
- Grissmer, D., Kirby, S., Berends, M., & Williamson, S. (1999). Student Achievement and the Changing American Family. Santa Monica, CA: Rand.
- Hannah, R., & Baum, C. (2002). An Analysis of the Linkages Between High School Allowance, High School Marketplace Work and Academic Success in Higher Education. *The High School Journal*, 85(3), 1–12.
- Holloway, J. (2001). Part-Time Work and Student Achievement. *Educational Leadership*, 58(7), 83–84.
- Jeynes, W. (2002). The Relationship Between the Consumption of Various Drugs by Adolescents and Their Academic Achievement. *American Journal of Drug and Alcohol Abuse*, 28(1), 15–35.
- Kaufman, P., Bradby, D., & Teitelbaum, P. (2000). High Schools That Work and Whole School Reform: Raising Academic Achievement of Vocational Completers Through the Reform of School Practice. National Center for Research in Vocational Education, University of California at Berkeley.
- Lent, R., Hackert, G., & Brown, S. (1996). A Social Cognitive Framework for Studying Career Choice and Transition to Work. *Journal of Vocational Education Research*, 21(4), 3–19.
- Lewis, M., Gill, L., & Lundquist, P. (1996). National Standards and Learning in Automobile Technician Training Programs. *Journal of Vocational Education Research*, 21(3), 3–17.

- Maccini, P., McNoughton, D., & Ruhl, K. (1999). Algebra Instruction for Students with Disabilities: Implications from a Research Review. *Learning Disability Quarterly*, 22(2), 113–126.
- Marsh, H. & Kleitman, S. (2002). Extracurricular School Activities: The Good, the Bad, and the Nonlinear. *Harvard Educational Review*, 72(4), 462–511.
- Monk, D. H. (1994). Subject Area Preparation of Secondary Mathematics and Science Teachers and Student Achievement. *Economics of Education Review*, 13, 125–145.
- Oetinger, G. (1999). Does High School Employment Affect High School Academic Performance? *Industrial and Labor Relations Review*. 53(1), 136–151.
- Pliska, A., Hackman, M., & Source, D. (2001). The Relationship Between Secondary School Scheduling Models and ACT Assessment Scores. *NASSP Bulletin* 85(625), 42-55.
- Quirk, K. (2001). Employment During High School and Student Achievement: Longitudinal Analysis of National Data. *Journal of Educational Research*, 95, 4–10.
- Rosenbaum, J., (1999). Preconditions for Effective School–Work Linkages in the United States. In D. Stern and D. Wagner (Eds.), *International Perspectives on the School-to-Work Transition*, Cresskill, NJ: Hampton Press.
- Ross, C. & Broh, B. (2000). The Roles of Self-Esteem and the Sense of Personal Control in the Academic Achievement Process. *Sociology of Education*. 73(4), 270–284.
- Rumberger, R., & Larson, K. (1998). Toward Explaining Differences in Educational Achievement Among Mexican American Language-Minority Students, *Sociology of Education*, 71, 68–92.
- Singh, K. (1998). Part-Time Employment in High School and Its Effect on Academic Achievement. *Journal of Educational Research*, 91(2), 67–74
- Simon, B. (2001). Family Involvement in High School: Predictors and Effects. *NASSP Bulletin* 85(627), 8–13.
- Stone, J., & Josian, B. (2000). The Impact of School Supervision of Work and Job Quality on Adolescent Work Attitudes and Job Behaviors. *Journal of Vocational Education Research*, 25(4), 532.
- Tienken, C. (2001). State Standards, Assessments and Instruction. ERIC Digest. ERIC Clearinghouse on Assessment and Evaluation, ED458215.
- Valverde, L., Scribner, A., & Source, K. (2001). Latino Students: Organizing Schools for Greater Achievement. *NASSP Bulletin* 85(624), 22–31.
- Visher, M., Emanuel, D., & Teitelbaum, P. (1999). *Key High School Reform Strategies: An Overview of Research Findings*. Washington, DC: U.S. Department of Education.
- Walberg, H. (1992). The Knowledge Base for Educational Productivity. *International Journal of Educational Reform*, 1(1), 1–10.
- Whitehurst, G. (2002). Research on Teacher Preparation and Professional Development. White House Conference on Preparing Tomorrow’s Teachers. Retrieved from <http://www.ed.gov/inits/preparingteachersconference/whitehurst.html>

Chapter 2. Perkins III Core Indicators: Postsecondary Academic Attainment (1P1) and Vocational Skill Attainment (1P2)

Table 4
Root and Indirect Causes for Postsecondary Attainment (1P1 and 1P2)

Root (Direct) Causes	What the Literature Says
Student motivation and engagement	<p><u>Theory</u>: Students with strong commitment to and involvement in learning, and strong motivation to demonstrate achievement will have higher levels of academic and vocational/technical skill attainment, as measured by successful course completions, higher grade point averages, and higher certification passage rates. Student motivation can be either intrinsic (for its own sake) or extrinsic (to achieve or accomplish something else of value).</p> <p><u>Evidence</u>: No consistent and direct research evidence was found for the expected impact of student motivation on academic and vocational/technical skill attainment. There is some evidence on a few indirect causes, listed below.</p> <p><u>Indirect Causes</u>: Student motivation and engagement may be affected by the following indirect causes, based on research evidence from secondary schools and at the college level. References below indicate evidence at the college level.</p> <ul style="list-style-type: none"> ❑ <u>Goal clarity and relevance</u>. Students who develop goals and plans for further education and employment, and see the relevance of their courses to their career and educational goals (e.g., transfer credits, qualify for a good job) will be more motivated to learn and demonstrate achievement. Students are more motivated to learn and will persist in the face of difficulty when they find learning personally interesting and meaningful, or directly relevant to something that they value. Research has found some evidence that goal clarity, as measured by career plan certainty, affects academic achievement in college (Thombs, 1995; Haislett & Hafer, 1990). ❑ <u>Perceived chances for success and self-confidence</u>. Students who have strong internal control orientations are more likely to assume that they will achieve success by working hard, and will demonstrate higher levels of effort and engagement. Students with strong academic control are more successful in college than other students (Perry, Hladkyj, Pekrun, & Pelletier, 2001). Students with higher reported levels of confidence in their ability to learn and succeed in college, and a strong sense of independence will perform at higher levels (Dutrow & Houston, 1981). Self-confidence in learning and preparation for college work is a predictor of academic achievement for college-student achievement (Goolsby, 1988; House, 1995b), even for reentering students (Thieman & Marsh-Williams, 1984). Self-confidence in learning skills and expectations for success were found to be major predictors of achievement for African-American community college students (Trippi & Stewart, 1989). ❑ <u>Peer and campus culture</u>. The norms and morale of peer groups within classrooms and campuses that discourage or do not promote effort and enthusiasm for learning and achievement have major impacts on motivation and engagement.

Root (Direct) Causes	What the Literature Says
	<ul style="list-style-type: none"> ❑ <u>Rewards and consequences for passing external exams.</u> Moderate- to high-stakes external examinations that have real consequences for students and college programs (e.g., licensing and certification exams) will increase student skill attainment. ❑ <u>Social integration.</u> Students will be more engaged in learning if they are socially integrated into college life and interact with other students and instructors. Some research suggests that students who interact informally with faculty have higher levels of academic attainment (Thompson, 2001). This indirect cause is used in community college retention studies (Andreu, 2002). ❑ <u>Work and family commitments.</u> Students who work a large number of hours per week during the school year and/or have major family work commitments and related responsibilities (e.g., are single parents) are less engaged in college courses and programs. Research evidence is mixed. Students with work more than 20 hours per week were found to have lower achievement and completion rates in nursing programs (Wilson, 2001). However, other research at community colleges found no effects of working on achievement or completion (Balunas, 1986).
<p>Time on task</p>	<p><u>Theory:</u> Students who spend more time engaged in learning (e.g., more or longer courses and class sessions, more learning time within existing classes, homework, internships and work-based learning) will have higher levels of academic achievement.</p> <p><u>Evidence:</u> Time on task has been shown in research to affect student achievement, as measured by attendance and study time.</p> <p><u>Indirect Causes:</u> Time on task may be affected by the following indirect causes, based on research evidence from secondary schools and at the college level. References below indicate evidence at the college level. Time on task is affected by the following indirect causes:</p> <ul style="list-style-type: none"> ❑ <u>Attendance.</u> Attendance has a major impact on time on task and student achievement (Davenport, 1990; Jing & Mayer, 1995; Brown, Graham, Money, & Rakoczy, 1999). ❑ <u>Study time.</u> Colleges can extend time on task by requiring students to do work outside of class time. Some evidence suggests that students who spend more time studying outside of class have higher levels of academic performance (Schuman, Walsh, Olsen, & Etheridge, 1985). ❑ <u>Tutoring and support services.</u> Colleges can increase time on task for students by providing additional tutoring and support services. ❑ <u>Work and family commitments.</u> Students who work a large number of hours per week during the school year, and/or have major family work commitments and related responsibilities are less engaged and spend less time concentrated on college work, unless the work is directly related to and integrated with their program of study (e.g., internships). Research evidence is mixed. Students with work more than 20 hours per week were found to have lower achievement and completion rates in nursing programs (Wilson, 2001). However, other research at community colleges found no effects of working on achievement or completion (Balunas, 1986). Some research suggests that parents with children, especially single parents, have lower levels of attendance because of work and family commitments, which results in lower levels of achievement (Jing & Mayer, 1995).

Root (Direct) Causes	What the Literature Says
<p>Instructional practices</p>	<p><u>Theory</u>: Students who receive high-quality instruction will be more motivated and engaged in their own learning, and will receive the type of instruction and overall support necessary for them to achieve higher grades and perform better on industry and professional certification examinations.</p> <p><u>Evidence</u>: Research suggests that instructional practices have a direct impact on achievement, especially for students who are not familiar with the content of courses (Schonwetter, Clifton, & Perry, 2002). Some research has shown that instructional differences account for a significant share of differences in student attainment at colleges. This research suggests that instructor differences may explain more variance than placement-test scores and demographic characteristics (Spahr, 1983). Research also suggests that instructional practices have a major impact on student achievement for students in remedial or developmental courses. Research has found that students who were taught using learner-centered instructional practices attain higher grades than other students (Miglietti & Strange, 1998).</p> <p><u>Indirect Causes</u>: Effective instructional practices may be affected by the following indirect causes, based on research evidence from secondary schools and at the college level. References below indicate evidence at the college level.</p> <ul style="list-style-type: none"> ❑ <u>Instructor ability and subject knowledge</u>. The general academic ability of instructors, especially verbal ability, as measured by aptitude tests, and the subject knowledge of instructors, as measured by direct assessments, or whether instructors are teaching subjects they have been trained to teach (i.e., in-field teaching) will have a strong effect on the quality of instruction. ❑ <u>Focused professional development</u>. Highly focused and intensive professional development tied specifically to the standards, content, and curriculum of a specific subject area, such as math or automotive technology, will improve instructor and student performance. ❑ <u>Instructor and program resources</u>. Instructors who have access to sufficient resources to meet core academic and vocational/technical learning objectives (e.g., equipment, support materials) will use more effective instructional practices and promote higher levels of attainment. ❑ <u>Accessibility to students</u>. Instructors who meet with students on a regular basis outside of class will promote higher levels of student achievement. Some research suggests that students who interact informally with faculty have higher levels of academic attainment (Thompson, 2001).
<p>Curriculum alignment</p>	<p><u>Theory</u>: Programs in colleges that directly align curriculum internally and to external industry and professional standards used in external examinations and certifications will have higher rates of student attainment of academic and vocational/technical skills.</p> <p><u>Evidence</u>: No consistent research evidence was found linking curriculum alignment to academic and vocational/technical skill attainment. However, some research suggests that the lack of consistency in what is taught in courses will affect student achievement. Students who were taught by a part-time teacher in their first course, and by a full-time instructor in their second course had lower grades than other students (Burgess & Samuels, 1999).</p>

Root (Direct) Causes	What the Literature Says
<p>Prior learning</p>	<p><u>Theory</u>: Students with high levels of prior learning and who have developed strong general verbal and mathematical abilities will have the necessary academic and technical foundations to be successful in attaining college-level academic and technical skills. Also, students who have not developed effective learning strategies will have more difficulty in college environments.</p> <p><u>Evidence</u>: Prior learning and academic achievement in high school, as measured by high school grade point average and standardized entrance exams and aptitude tests, especially in reading and math, are strong and consistent predictors of course grades in college across a variety of academic and career areas, and in professional certification such as nursing. The same applies to different student populations, including high-risk populations (Yess, 1979; Royer, 1990; Wilson, 2001; Emmeluth, 1979; Ozsogomonyan, 1979; Rubin & Graham, 1986; Ewing, 1986; Goolsby, 1988; Belcher, 1989; Noble & Sawyer, 1989; Haislett & Hafer, 1990).</p>
<p>Barriers to learning</p>	<p><u>Theory</u>: Students who face learning disabilities and language barriers (e.g., English as Second Language) will have more difficulty in attaining academic and vocational/technical skills than other students.</p> <p><u>Evidence</u>: Research has found consistent effects of learning disabilities and language problems on student academic and vocational/technical skill attainment. Students with limited English skills have lower achievement and completion levels in nursing programs (Wilson, 2001).</p>

Table 5
Causes Outside Control for Postsecondary Attainment (1P1/1P2)

Causes Outside Control	What the Literature Says
<p>Demographic characteristics</p>	<p><u>Theory</u>: Students from minority groups with historically less access and success in higher education, and students from families with low income who face financial constraints in entering and remaining in college will have lower levels of academic and vocational/technical skill attainment.</p> <p><u>Evidence</u>: Demographic characteristics, such as race/ethnicity and income, have been widely used in research to predict student achievement and attrition in college for both traditional and nontraditional students (Bean & Metzner, 1985).</p>
<p>Career and further education opportunities</p>	<p><u>Theory</u>: Students with better and more diverse career and further education opportunities in their communities will be more motivated to learn and demonstrate attainment of academic and vocational/technical skills.</p> <p><u>Evidence</u>: No research was found on the impact of perceived or actual opportunities on skill attainment for college students.</p>
<p>Student financial aid availability</p>	<p><u>Theory</u>: Students with access to financial aid and related support services will be able to devote more time and exert greater effort in academic and vocational courses because they will not have to devote attention and time to making a living and addressing related family needs (e.g., child care).</p> <p><u>Evidence</u>: No research was found on the impact of financial aid on academic and vocational skill attainment and course completion.</p>

Table 6
Improvement Strategies for Postsecondary Attainment (IP1 and IP2)

Improvement Strategy	Root Causes Addressed	What the Literature Says
<p>Academic integration</p>	<ul style="list-style-type: none"> ❑ Student motivation and engagement ❑ Time on task ❑ Instructional practices 	<p><u>Theory and Models:</u> Colleges can increase the integration of academic and vocational courses, including developmental and regular academic courses. There are a wide variety of models and approaches used by community colleges (Perin, 2001; Prentice, 2001). There are also many “bridge program” models for integrating adult education and literacy within vocational programs (National Governors Association, 2002).</p> <p><u>Evidence:</u> Although research shows that student goal relevance and student-centered instructional strategies have impacts on success in college courses, there is no direct evidence that academic integration has an impact on the attainment of academic and vocational/technical skills in college.</p>
<p>Career/academic guidance and mentoring</p>	<ul style="list-style-type: none"> ❑ Student motivation and engagement 	<p><u>Theory and Models:</u> Students who have clear career and educational goals, and who see the relevance of academic and vocational/technical courses to these goals, are more likely to be motivated and engaged to learn and demonstrate achievement (Diegelman & Subich, 2001). In addition, students who have close and direct contact with instructors, counselors, and adult career and educational mentors will be more motivated and engaged. There are many models of integrated career and academic counseling and adult mentoring (Wallace, 2001).</p> <p><u>Evidence:</u> No research was found that provided evidence on the effects of career and academic counseling and mentoring.</p>
<p>Professional development for part-time faculty</p>	<ul style="list-style-type: none"> ❑ Instructional practices ❑ Curriculum alignment 	<p><u>Theory and Models:</u> Colleges are using an increasing number of part-time faculty who have extensive industry and professional experience, but have very little training as instructors and are not fully aware of the content of the entire curriculum for specific programs. There are many different models and approaches to the orientation and professional development of college instructors.</p> <p><u>Evidence:</u> Although research has shown that students perform at lower levels when taking sequences of courses that start with part-time faculty, there is no research that supports specific models or approaches to the professional development of part-time faculty.</p>

References

- Andreu, M. (2002). Developing and Implementing Local-Level Retention Studies: A Challenge for Community College Institutional Researchers. *Community College Journal of Research and Practice*, 26, 333–344.
- Balunas, L. (1986). A Study of the Effects of Student Employment on Grade Point Average and Retention at Broome Community College. Working Paper Series No. 3-86. ED277446.
- Bean, J., & Metzner, B. (1985). A Conceptual Model of Non-Traditional Undergraduate Student Attrition. *Review of Educational Research*, 55(4), 485–540.
- Belcher, M. (1989). Factors That Affect Success in Nursing. *Research Report No. 89-28*. ED328316.
- Brown, B., Graham, C., Money, S., & Rakoczy, M. (1999). Absenteeism and Grades in a Nursing Curriculum. *Michigan Community College Journal: Research and Practice*, 5(2), 81–84.
- Burgess, L., & Samuels, C. (1999). Impact of Full-Time Versus Part-Time Instructor Status on College Student Retention and Academic Performance in Sequential Courses. *Community College Journal of Research and Practice*, 23(5), 487–98.
- Davenport, W. (1990). A Study of the Relationship Between Attendance and Grades of Three Business Law Classes at Broome Community College. ED340433.
- Diegelman, N., & Subich, L. (2001). Academic and Vocational Interests as a Function of Outcome Expectations in Social Cognitive Career Theory. *Journal of Vocational Behavior*, 59, 394–405.
- Dutrow, A., & Houston, C. (1981). An Analysis of the Relationships of Academic Success and Selected Achievement/Aptitude Tests. ED207636.
- Emmeluth, D. (1979). An Assessment of Selected Variables Affecting Success in Community College Introductory Biology. ED174298.
- Ewing, G. (1986). Predicting Grades in Chemistry 101. ED281776.
- Goolsby, C. (1988). Factors Affecting Mathematics Achievement in High Risk College Students. *Research and Teaching in Developmental Education*, 4(2), 18–27.
- Haislett, J., & Hafer, A. (1990). Predicting Success of Engineering Students During the Freshman Year. *The Career Development Quarterly*, 39, 1–8.
- Hogrebe, M. (1985). Student Perceptions as Predictors of Academic Performance in College Developmental Studies. *Educational and Psychological Measurement*, 45(3), 639–46.
- House, J. (1995a). Noncognitive Predictors of Achievement in a General Education Course: A Multi-Institutional Study. ED390321.
- House, J. (1995b). Student Motivation, Previous Instructional Experience, and Prior Achievement as Predictors of Performance in College Mathematics. *International Journal of Instructional Media*, 22(2), 157–167.
- Jing, J., & Mayer, L. (1995). Single Parents: In Need of a Support Network.

Improving Performance on Perkins III Core Indicators

- Miglietti, C., & Strange, C. (1998). Learning Styles, Classroom Environment Preferences, Teaching Styles, and Remedial Course Outcomes for Underprepared Adults at a Two-Year College. *Community College Review*, 26(1), 1–19.
- National Governors Association (2002). A Governor's Guide to Creating a 21st Century Workforce. Washington, DC: National Governors Association.
- Noble, J., & Sawyer, R. (1989). Predicting Grades in College Freshman English and Mathematics Courses. *Journal of Student Development*, 30(4), 345–353.
- Ozsohomonyan, A. (1979). Predictors of General Chemistry Grades. *Journal of Chemical Education*, 56(3), 173–175.
- Perin, D. (2001). Academic–Occupational Integration as a Reform Strategy for the Community College: Classroom Perspectives. *Teachers College Record*, 103(2), 303–335.
- Perry, R., Hladkyj, S., Pekrun, R., & Pelletier, S. (2001). Academic Control and Action Control in the Achievement of College Students: A Longitudinal Field Study. *Journal of Educational Psychology*, 93, 776–789.
- Prentice, C. (2001). ERIC Review: Integrating Academic and Occupational Instruction. *Community College Review*, 29(2), 80–86.
- Robiak, J., & Downey, R. (1979). The Prediction of Long-Term Academic Performance after the Completion of a Study Skills Course. *Measurement and Evaluation in Guidance*, 12(2), 108–111.
- Royer, J. (1990). The Prediction of College Course Performance Form Reading Comprehension Performance: Evidence for General and Specific Prediction Factors. *American Educational Research Journal*, 27(1), 158–179.
- Rubin, R., & Graham, E. (1986). Communication Determinants of College Success: An Exploratory Investigation. ED278073.
- Sanchez, I. (2000). Motivating and Maximizing Learning in Minority Classrooms. *New Directions for Community Colleges*, 112, 35–44.
- Schonwetter, D., Clifton, R., & Perry, R. (2002). Content Familiarity: Differential Impact of Effective Teaching on Student Achievement. *Research in Higher Education*.
- Schuman, H., Walsh, E., Olsen, C., & Etheridge, B. (1985). Effort and Reward: The Assumption That College Grades Are Affected by the Quantity of Study. *Social Forces*, 63, 945–966.
- Spahr, A. (1983). An Investigation of the Effect of Several Variables on Students' Grades in Rhetoric College Algebra and I. ED258669.
- Stromei, L. (2000). Increasing Retention and Success Through Mentoring. *New Directions for Community Colleges*, 112, 55–62.
- Swigart, T., & Murrell, P. (2001). Factors Influencing Estimates of Gains Made Among African-American and Caucasian Community College Students. *Community College Journal of Research and Practice*, 25(4), 297–312.
- Thieman, T., & Marsh-Williams, P. (1984). Prediction of Academic Performance of Adult Women in a Weekend College Program. *Journal of College Student Personnel*, 25(3), 260–264.

- Thombs, D. (1995). Problem Behavior and Academic Achievement Among First-Semester College Freshmen. *Journal of College Student Development*, 36(3), 280–288.
- Thompson, M. (2001). Informal Student Interaction: Its Relationship to Educational Gains in Science and Mathematics Among Community College Students. *Community College Review*, 29(1), 35–57.
- Trippi, J., & Stewart, J. (1989). The Relationship Between Self-Appraisal Variables and the College Grade Performance and Persistence of Black Freshmen. *Journal of College Student Development*, 30(6), 484–491.
- Wallace, J. (2001). The Benefits of Mentoring for Female Lawyers. *Journal of Vocational Behavior*, 58, 366–391.
- Wilson, M. (2001). Predicting Student Retention and Academic Achievement in Western United States Associate Degree in Nursing Programs. ED458911.
- Yess, J. (1979). Predicting the Academic Success of Community College Students in Specific Programs of Study. ED172900.

Chapter 3. Perkins III Core Indicator: Secondary Completion (2S1)

Table 7
Root and Indirect Causes for Secondary Completion (2S1)

Root (Direct) Causes	What the Literature Says
Student engagement	<p><u>Theory</u>: Students who are not academically and socially engaged in high school are less likely to perform at high academic Levels, and are less likely to complete high school.</p> <p><u>Evidence</u>: A large proportion of students who drop out report that they “did not like school” and “could not get along with teachers” as their reasons for leaving school (Berktoold, Geis, & Kaufman, 1998). It is likely that poor student engagement is manifested in high-risk behaviors (e.g., truancy, delinquency) and poor academic performance—both of which are predictors of school dropout. Interestingly, some researchers have found that student engagement can predict dropping out even after controlling for the effect of academic achievement and other sociodemographic characteristics (Rumberger, 2001).</p> <p><u>Indirect Causes</u>: Students’ lack of engagement in school is also related to the following:</p> <ul style="list-style-type: none"> ❑ <u>School organization</u>. School size appears to be inversely associated with student engagement. Students in small schools and schools that provide smaller learning environments are more likely to report feeling academically engaged (Baker & Sansone, 1990; Lee & Burkam, 2001; Wehlage & Rutter, 1986; Woods, 1995). ❑ <u>Educational expectations</u>. Students respond to the expectations placed upon them. Specifically, students who feel unmotivated, or perceive their environment as being unchallenging, are more likely to disengage from their education (Druian & Butler, 1987).
High-risk behavior	<p><u>Theory</u>: Students who engage in high-risk behaviors in high school are more likely to be distracted from their educational Pursuits, and are consequently more likely to drop out of school. High-risk behaviors typically include, but are not limited to, early pregnancy, crime, violence, delinquency, and drug abuse.</p> <p><u>Evidence</u>: A considerable body of research has shown that students who engage in high-risk activities are not only more likely to perform poorly academically, but are also more likely to drop out of school (Alexander, Entwisle, & Horsey, 1997; Druian & Butler, 1987; Rumberger & Larson, 1998; Rumberger, 2001; Woods, 1995). Researchers have recently begun to emphasize the need to also identify “protective factors” that counteract the deleterious effect of risk factors on high school completion (Jessor, 1993; National Research Council, Panel on High-Risk Youth, 1993).</p>

Root (Direct) Causes	What the Literature Says
	<p>Indirect Causes: Researchers point out that high-risk behaviors such as delinquency and drug abuse might not be direct predictors of dropping out, but might be manifestations of other personal and social characteristics that cause students to engage in these behaviors in the first place (Ellickson, Tucker, & Klein, 2001; Ellickson, Bui, Bell, & McGuigan, 1996). High-risk behaviors may be related to the following:</p> <ul style="list-style-type: none"> ❑ Family background and environment. Factors such as low family income, low parental education, and single-parent homes are typically associated with high-risk behavior in students (Druian & Butler, 1987). ❑ Personal characteristics. Factors such as negative self-perceptions, poor self-esteem, boredom, and social alienation are all associated with high-risk behaviors (Druian & Butler, 1987).
<p>Academic performance</p>	<p>Theory: Students who perform poorly in school are disengaged from the learning process, and are ultimately more likely to withdraw from school by dropping out.</p> <p>Evidence: Research suggests that poor academic performance is one of the most powerful predictors of dropping out (Finn, 1989; Garnier, Stein, & Jacobs, 1997; Roderick, 1993; Swanson & Schneider, 1999). Studies have found that early academic achievement in elementary school can predict high school completion (Goldschmidt & Wang, 1999; Rumberger, 1995; Rumberger & Larson, 1998). One study found that differences in the academic grades of high school completers vs. those of dropouts emerge as early as fourth grade, and the gap in grades continues to increase prior to leaving school (Roderick, 1993).</p> <p>Indirect Causes: Students’ poor academic performance is also related to the following:</p> <ul style="list-style-type: none"> ❑ Low student engagement. Students who are socially and academically disengaged from school are more likely to perform poorly in school (Rumberger, 2001).
<p>School organization and curriculum</p>	<p>Theory: High school structure and organization—as reflected in curriculum, school size, and social relations—influence students’ decisions to complete their schooling.</p> <p>Evidence: Research indicates that one aspect of school structure that is consistently associated with high school completion is school size; i.e., schools that have fewer students and a small student–teacher ratio are more likely to meet the educational needs of students, leading to greater student engagement and motivation (Baker & Sansone, 1990; Lee & Burkam, 2001; Wehlage & Rutter, 1986; Woods, 1995). It is also becoming increasingly clear that students at risk for dropping out are most likely to be found in schools that provide little overall support to students, that have low expectations of students, and that have a poorly focused curriculum (Druian & Butler, 1987).</p>

Root (Direct) Causes	What the Literature Says
School climate	<p><u>Theory</u>: Students in schools that provide them with a safe, orderly, and supportive learning environment are more likely to persist in school.</p> <p><u>Evidence</u>: Students in schools that involve teachers and parents in creating a cohesive and secure, family-like atmospheres are more likely to attend classes and complete their high school education (Ashe, 1993; Woods, 1995). Collegiality and collaboration among teaching staff also plays a key role in providing a supportive learning environment for students at risk for dropping out (Druian & Butler, 1987; Lee & Burkam, 2001).</p>
Grade retention	<p><u>Theory</u>: Students who are held back in a grade for academic reasons are likely to face an irreversible disadvantage that is reflected in poor completion rates.</p> <p><u>Evidence</u>: Although past research has suggested that retention can have a positive effect on academic achievement, an increasing body of research is beginning to show that being held back is a key predictor of dropping out of high school (Goldschmidt & Wang, 1999; Heubert & Hauser, 1999; Jimerson, 1999; Kaufman & Bradby, 1992). One finding is that students who were retained in grades 1 through 8 had a much higher likelihood of dropping out, even after controlling for sociodemographic and school characteristics (Rumberger, 1995; U.S. Department of Education, 1997).</p>

Table 8
Causes Outside Control for Secondary Completion (2S1)

External Conditions/ Constraints	What the Literature Says
<p>Family demographic characteristics and support structure</p>	<p><u>Theory</u>: Family demographic characteristics and support determine the amount of human (parental education), financial (household income), and social (family structure and relationships) capital available to a student and, as a result, have a bearing on his/her educational experiences and outcomes.</p> <p><u>Evidence</u>: Research has consistently demonstrated that sociodemographic characteristics, such as socioeconomic status measured by parents' education and income, are strongly associated with the likelihood of completing high school (Coleman, 1988; McNeal, 1999; Rumberger, 2001; Rumberger, 1995; Rumberger & Larson, 1998; Pong & Ju, 2000; Woods, 1995). Recent studies have also pointed to the role of family structure in high school completion; i.e., students from single-parent and stepfamilies are more likely to drop out of school (Goldschmidt & Wang, 1999; McNeal, 1999). However, a more recent study suggests that the breakdown of a two-parent family does not have a direct effect on high school completion, but rather has an indirect effect on it through the loss of overall family income (Pong & Ju, 2000).</p>
<p>Student transfer and mobility</p>	<p><u>Theory</u>: Students who change schools often are more likely to experience a significant disruption in their schooling, and are less likely to complete school.</p> <p><u>Evidence</u>: Considerable research suggests that student mobility, whether it involves changing a residence or changing a school, is highly associated with the likelihood of dropping out (Astone & McLanahan, 1994; Haveman, Wolfe, & Spaulding, 1991; Rumberger & Larson, 1998). One study found that most high school dropouts changed high school at least once (Rumberger, Larson, Palardy, Ream, & Schleicher, 1998). However, this study focused on Latino adolescents in California, and was not representative of students across the country.</p>
<p>Labor force participation</p>	<p><u>Theory</u>: High school students who work while in school are more likely to spend time less time on academic activities at school and at home, and are therefore also less likely to complete high school.</p> <p><u>Evidence</u>: While researchers agree that students who work are more likely to drop out of school, there is debate about the threshold at which labor force participation affects high school completion. Some researchers have suggested that employment of 16 or more hours per week is significantly associated with dropping out of high school (Mann, 1986; Woods, 1995); others suggest that working half-time or more (20 hours or more) per week is associated with dropping out (Winters, 1986).</p>

Table 9
Improvement Strategies for Secondary Completion (2S1)

Improvement Strategy	Root Causes Addressed	What the Literature Says
<p>Drop-out prevention programs</p>	<ul style="list-style-type: none"> <input type="checkbox"/> Student engagement <input type="checkbox"/> High-risk behavior <input type="checkbox"/> Academic performance 	<p><u>Theory and Models:</u> While many different models of dropout prevention exist, effective programs share the following features:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Early identification of potential dropouts; <input type="checkbox"/> Early and individualized intervention that involves the family to the extent possible; <input type="checkbox"/> Community-based dropout prevention programs that engage family and community; and <input type="checkbox"/> Support programs that help students cope with high-risk behaviors. <p><u>Evidence:</u> Research suggests that because risk factors for dropping out can appear as early as elementary school, effective prevention strategies should begin early in a child’s education trajectory (Woods, 1995). In addition to identifying at-risk students early and providing them with appropriate educational interventions, effective approaches to dropout prevention recognize the need for providing students with social and health services that address related problems such as substance abuse, teen pregnancy, and suicide (Woods). Finally, effective dropout prevention programs focus not only on school-level changes, but also involve the family and community in an attempt to address the environmental risk factors that often accompany dropping out (Rumberger, 2001).</p>
<p>School structure and climate changes</p>	<ul style="list-style-type: none"> <input type="checkbox"/> School organization and curriculum <input type="checkbox"/> School climate 	<p><u>Theory and Models:</u> Schools can promote a more positive overall school climate by adopting a variety of strategies that range from re-structuring learning environments in the school to involving all stakeholders in the educational and dropout prevention process. These strategies focus on:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Strong administrative leadership; <input type="checkbox"/> School discipline that is enforced in a fair and consistent manner; <input type="checkbox"/> Careful monitoring of student progress; <input type="checkbox"/> Improving school climate by involving staff, parents, and children in developing programs that improve the safety and security of the school; and <input type="checkbox"/> Creating more personalized learning environments through smaller class size and schools-within-schools.

Improvement Strategy	Root Causes Addressed	What the Literature Says
		<p><u>Evidence:</u> Evaluations of effective approaches to addressing the dropout issue have pointed to the importance of an overall positive climate in a school (Dynarski & Gleason, 1998). Schools can establish a climate conducive to student learning and retention by adopting the following features: (a) a safe learning environment, (b) staff who are committed to student success, (c) a school culture of professional collegiality, and (d) small class sizes (Ashe, 1993; Rumberger, 2001; Hamilton, 1986; Woods, 1995). Of these factors, small school size has received the most attention, with several studies suggesting that smaller schools are more likely to better engage both students and staff in the learning process (Rumberger, 2001; Wehlage, Rutter, Smith, Lesko & Fernandez, 1989).</p>
<p>Curriculum and classroom-level changes</p>	<ul style="list-style-type: none"> ❑ Student engagement ❑ High-risk behavior ❑ Academic performance ❑ School organization and curriculum ❑ School climate 	<p><u>Theory and Models:</u> Curricula and classroom instruction that make learning more relevant and intellectually challenging for students are effective approaches to increasing student engagement and reducing dropout rates. These curriculum and classroom-level changes focus on:</p> <ul style="list-style-type: none"> ❑ Holding all students to high standards of learning and academic performance; ❑ Providing students at risk for dropping out with the extra support they need to meet high academic standards; ❑ Engaging students through classroom instruction that is contextualized, relevant, and tied to the world of work; ❑ Increasing student motivation and engagement by collaborating with the local community and businesses; ❑ Supporting transitions from high school to college through improved collaboration between high school and postsecondary institutional staffs; and ❑ Assisting students with limited English proficiency to improve their knowledge of English. <p><u>Evidence:</u> An overwhelming body of research points to two broad strategies for reducing the dropout rate: making learning more relevant, and promoting high expectations of all students (Druian & Butler, 1987; Wehlage, 1983; Woods, 1995). Schools can adopt the following types of strategies to improve the relevance of curriculum: (a) integrating career-related information with academic instruction, (b) collaborating with local businesses and employers to provide students with work-based learning experiences, and (c) improving ties with postsecondary institutions to motivate and better prepare students for transition from high school to college (Woods, 1995). Research not only points to the need to hold all students—including those at risk for</p>

Improvement Strategy	Root Causes Addressed	What the Literature Says
		dropping out—to high standards, but to also provide at-risk students with the extra support they need to meet high standards. This extra support is crucial, since adopting high standards and performance expectations may actually increase dropout rates for students who are already performing poorly in school.

References

- Alexander, K. K., Entwisle, D. R., & Horsey, C. (1997). From first grade forward: Early foundations of high school dropout. *Sociology of Education, 70*, 87–107.
- Ashe, J. A. (1993). *Finish for the future: America's communities respond*. Alexandria, VA: National Association of Partners in Education.
- Astone, N. M., & McLanahan, S. S. (1994). Family structure, residential mobility, and school dropout: A research note. *Demography, 31*, 575–584.
- Baker, J., & Sansone, J. (1990). Interventions with students at-risk for dropping out of school: A high school responds. *The Journal of Educational Research, 83*(4), 181–186.
- Berkthold, J., Geis, S., & Kaufman, P. (1998). *Subsequent educational attainment of high school dropouts*. Washington, DC: U.S. Department of Education.
- Christenson, S., Sinclair, M., Thurlow, M., & Evelo, D. (1995). *Tip the balance: Policies and practices that influence school engagement for youth at high risk for dropping out*. ABC Dropout Prevention and Intervention Series. Washington, DC: U.S. Department of Education, Office of Special Education Programs.
- Coleman, J. S. (1988). Social capital in the creation of human capital. *American Journal of Sociology, 94*, S95–S120.
- Druian, G., & Butler, J. A. (1987). *Effective schooling practices and at-risk youth: What the research shows*. NorthWest Regional Educational Laboratory.
- Dynarski, M., & Gleason, P. (1998). *How can we help? What we have learned from federal dropout-prevention programs*. Princeton, NJ: Mathematica Policy Research.
- Ellickson, P. L., Bui, K., Bell, R., & McGuigan, K. (1996). Does early drug use increase the risk of dropping out of high school? *Journal of Drug Issues, 28*(2), 357–380.
- Ellickson, P. L., Tucker, J. S., & Klein, D. J. (2001). High-risk behaviors associated with early smoking: Results from a 5-year follow-up. *Journal of Adolescent Health, 28*(6), 465–473.
- Finn, J. D. (1989). Withdrawing from school. *Review of Educational Research, 59*, 117–142.
- Garnier, H. E., Stein, J. A., & Jacobs, J. K. (1997). The process of dropping out of high school: A 19-year perspective. *American Educational Research Journal, 34*, 395–419.
- Goldschmidt, P., & Wang, J. (1999). When can schools affect dropout behavior? A longitudinal multilevel analysis. *American Educational Research Journal, 36*(4), 715–738.
- Haveman, R., Wolfe, B., & Spaulding, J. (1991). Childhood events and circumstances influencing high school completion. *Demography, 28*, 133–157.
- Heubert, J. P., & Hauser, R. M. (Eds.) (1999). *High stakes: Testing for tracking, promotion, and graduation*. Washington, DC: National Academy.
- Jessor, R. (1993). Successful adolescent development among youth in high-risk settings. *American Psychologist, 48*, 117–126.

- Jimerson, S. R. (1999). On the failure of failure: Examining the association between early grade retention and education and employment outcomes during late adolescence. *Journal of School Psychology, 37*, 243-272.
- Kaufman, P., & Bradby, D. (1992). *Characteristics of at-risk students in the NELS:88*. Washington, DC: U. S. Government Printing Office.
- KLee, V. E., & Burkam, D. T. (2001). Dropping out of high school: The role of school organization and structure. Paper presented the conference, *Dropouts in America: How severe is the problem? What do we know about intervention and prevention?* Harvard Graduate School of Education, Cambridge, MA.
- Mann, D. (1986). Can we help dropouts? Thinking about the undoable. In G. Natriello (Ed.), *School dropouts: Patterns and Policies*. New York: New York College Press.
- McNeal, R. B. (1999). Parental involvement as social capital: Differential effectiveness on science achievement, truancy, and dropping out. *Social Forces, 78*, 117-144.
- National Research Council, Panel on High-Risk Youth. (1993). *Losing generations: Adolescents in high-risk settings*. Washington, DC: National Academy Press.
- Pong, S. L., & Ju, D.B. (2000). The effects of change in family structure and income on dropping out of middle and high school. *Journal of Family Issues, 21*, 147-169.
- Roderick, M. (1993). *The path to dropping out*. Westport, CN: Auburn House.
- Rumberger, R. W. (2001). Why students drop out and what can be done. Paper presented for the conference, *Dropouts in America: How severe is the problem? What do we know about intervention and prevention?* Harvard Graduate School of Education, Cambridge, MA.
- Rumberger, R. W., & Thomas, S. L. (2000). The distribution of dropout and turnover rates among urban and suburban high schools. *Sociology of Education, 73*, 39-67.
- Rumberger, R.W., & Larson, K.A. (1998). Student mobility and the increased risk of high school drop out. *American Journal of Education, 107*, 1-35.
- Rumberger, R.W., & Larson, K.A., Palardy, G.A., Ream, R.K., & Schleicher, N.A. (1998). *The hazards of changing schools for California Latino adolescents*. Berkeley, CA: Chicano/Latino Policy Project.
- Rumberger, R.W. (1995). Dropping out of middle school: A multilevel analysis of students and schools. *American Educational Research Journal, 32*, 583-625.
- Sander, W., & Krautmann, A. C. (1995). Catholic schools, dropout rates and educational attainment. *Economic Inquiry, 33*, 217-233.
- Swanson, C. B., & Schneider, B. (1999). Students on the move. Residential and educational mobility in America's schools. *Sociology of Education, 72*, 54-67.
- U.S. Department of Education. National Center for Education Statistics (1997). *Dropout rates in the United States: 1995*, NCES 97-473, by McMillen, M., Kaufman, P. and Klein, S. Washington, DC.

Improving Performance on Perkins III Core Indicators

Wehlage, G.G., Rutter, R.A., Smith, G.A., Lesko, N., & Fernandez, R.R. (1989). Reducing the risk: Schools as communities of support. New York: Falmer Press.

Wehlage, G. G., & Rutter, R. A. (1986). Evaluation of model program for at-risk students. Paper presented at the annual meeting of the American Educational Research Association, San Francisco, CA.

Woods, E. G. (1995). Reducing the dropout rate. NorthWest Regional Educational Laboratory.

Chapter 4. Perkins III Core Indicator: Postsecondary Degree or Credential (2P1)

Table 10
Root and Indirect Causes for Postsecondary Completion (2P1)

Root (Direct) Causes	What the Literature Says
<p>Academic preparation in high school</p>	<p><u>Theory</u>: Students who begin their postsecondary education with a strong academic foundation are more likely to persist in college and complete their degree.</p> <p><u>Evidence</u>: Students who do well in high school, who earn high scores on college entrance exams, and who attend high schools with high academic standards are more likely to persist and attain a postsecondary degree (Astin, 1997; Marcus, 1989). A good deal of research has also focused on high school curricula and its impact on postsecondary retention and completion; generally, students who attend schools judged as having strong curricula are more likely to complete undergraduate degrees than students exposed to less challenging high school instruction (Adelman, 1999). Students taking higher levels of mathematics are also most likely to complete college, as are those taking Advanced Placement (AP) courses. While it stands to reason that students who are well-prepared will have greater likelihood of collegiate success, it should be recognized that other individual, social, and economic characteristics can also affect completion—meaning that secondary educators should not overemphasize academics at the expense of other areas (Kerkvliet & Nowell, 2000).</p> <p><u>Indirect Causes</u>: Students’ preparation in high school is related to the following:</p> <ul style="list-style-type: none"> ❑ <u>Family background</u>. Sociodemographic characteristics such as family income, parents’ education, and race/ethnicity are associated with the level of high school curricula students complete (Horn & Kojaku, 2001). ❑ <u>Institutional demographics</u>. The level of high school curricula students complete is often a function of the economic standing of the high school’s student body, urbanicity, and size (Horn & Kojaku, 2001; U.S. Department of Education, 2000b).
<p>Patterns of postsecondary enrollment</p>	<p><u>Theory</u>: The timing of when students choose to enroll in a postsecondary institution and the intensity of this enrollment can affect postsecondary outcomes such as retention and completion.</p> <p><u>Evidence</u>: The timing of first postsecondary enrollment is a critical factor in postsecondary completion; i.e., a time lag of as little as 1 year between high school graduation and postsecondary enrollment is associated with lower rates of persistence and attainment (Cuccaro-Alamin, 1997). Interestingly, graduating from high school late does not have a bearing on postsecondary completion, provided that students enroll in a postsecondary institution soon after graduation. The intensity of enrollment, as measured by course load, also has a bearing on the likelihood of completion; i.e., full-time enrollment is associated with higher rates of persistence and attainment, meaning that students who stop out or attend classes on a part-time basis are less likely to complete their degree (Cuccaro-Alamin, 1997). Scheduling conflicts and the availability of course offerings that fit into students’ schedules can also affect students’ ability to obtain sufficient credits to graduate.</p>

Root (Direct) Causes	What the Literature Says
	<p><u>Indirect Causes:</u> A student’s pattern of postsecondary enrollment is related to the following indirect causes:</p> <ul style="list-style-type: none"> ❑ <u>Labor force participation.</u> Students who are employed while attending college are likely to carry less than a full course load, and are therefore less likely to attain a degree (Adelman, 1999; Hanniford & Sagariaa, 1994).
Transfer	<p><u>Theory:</u> Students who transfer among postsecondary institutions are less likely to complete their degree than students who persist in their initial institution.</p> <p><u>Evidence:</u> Research on the relationship between institutional transfer and postsecondary completion indicates that students who experience a stable educational program are more likely to complete their degree (Cuccaro-Alamin, 1997). Among those who do change institutions, individuals transferring from a 2- to a 4-college are just as likely to attain a degree, as those students who began their postsecondary education at a 4-year institution (Adelman, 1999; Cuccaro-Alamin, 1997). Generally, even in the absence of transfer, graduates of public 4-year institutions take longer to complete their bachelor’s degree than graduates of private, not-for-profit institutions (Cuccaro-Alamin).</p>
Remedial coursework	<p><u>Theory:</u> Students who require remedial coursework at the postsecondary level face an educational disadvantage that is reflected in poor retention and completion rates.</p> <p><u>Evidence:</u> The effect of postsecondary remediation on completion is a subject of continuing debate; research findings on this subject are also mixed. While a considerable body of research suggests that an increase in the number of remedial courses taken at the postsecondary level is associated with lower odds of completing a degree, exceptions have been noted (U.S. Department of Education, 2000b). For example, students who took only one remedial course (with the exception of remedial mathematics or reading) completed degrees at the same rate as students who took no remedial courses. Furthermore, students whose only remediation course was in mathematics were more likely to complete their degrees than students who took required remedial coursework in reading.</p>
Students’ academic and social integration	<p><u>Theory:</u> Students who identify with, and are acclimated to, the social and educational culture of their postsecondary institution are more likely to complete college.</p> <p><u>Evidence:</u> Researchers point to two important aspects of students’ sense of integration with their college: students’ social identification with the institution, and the match between students’ academic goals and their academic programs (Bean, 1980, 1983; Tinto, 1993; Wetzel, 1999). Generally, students who feel at home in their institution and who hold strong self-concepts of ability are more likely to persist and complete (Gerardi, 1996).</p>

Root (Direct) Causes	What the Literature Says
	<p><u>Indirect Causes</u>: Students' sense of purpose in an institution can be affected by:</p> <ul style="list-style-type: none"> ❑ <u>Teacher quality</u>. Instructors who can impart academic knowledge while maintaining positive student–teacher relationships can increase students' comfort levels (Dale & Zych, 1996). ❑ <u>College support services</u>. The availability of academic support services can assist students in making a positive connection with their institution (Johnes, 1997).

Table 11
Causes Outside Control for Postsecondary Completion (2P1)

Causes Outside Control	What the Literature Says
<p>Student demographic characteristics</p>	<p><u>Theory</u>: Students with certain demographic and family characteristics are likely to enter a postsecondary institution with an academic disadvantage that is reflected in lower persistence and completion rates.</p> <p><u>Evidence</u>: Most research on the role of demographic and family characteristics on postsecondary completion has focused on the effects of gender, race/ethnicity, parents’ education levels, and family income on student completion. A number of studies have suggested that undergraduate attainment levels are higher for men than for women (Day & Curry, 1996), and that race also plays a role in the likelihood of completing a postsecondary degree; specifically, Asian students are more likely to complete a bachelor’s degree than students of other races (Cuccaro-Alamin, 1997; Day & Curry). Students whose parents have earned a high school education or dropped out of school, are from families with low income, or who attended a high school in which 25% or more of the students were eligible for free or reduced-price lunches also have less likelihood of completing a postsecondary degree (Gerardi, 1996; U.S. Department of Education, 2000a; U.S. Department of Education, 2000b).</p>
<p>Labor force participation and wages</p>	<p><u>Theory</u>: Students who are employed in the workforce take longer to complete a degree, and are at greater risk of stopping out.</p> <p><u>Evidence</u>: The research on labor force participation and postsecondary completion is unequivocal: students who are employed, particularly those who are employed full-time, are less likely to persist in college, and less likely to attain a postsecondary degree (Cuccaro-Alamin, 1997; Hanniford & Sagaria, 1994). While the reasons for this are open to conjecture, it is likely that students who work have less time to devote to their studies, and also face other pressures (i.e., economic and social) that may interfere with their education. Research indicates that the relationship between wages and postsecondary completion is complex. Some researchers have found interesting nonlinear relationships between wages and postsecondary retention: an increase in wages is initially associated with an increase in the probability of retention; however, beyond a point, an increase in wages is associated with a decline in student retention, presumably because students decide they are better off working than in pursuing their degree (Mohanty & Finney, 1997).</p>
<p>Tuition and financial aid</p>	<p><u>Theory</u>: The cost of an education and the availability of financial aid can affect students’ decisions to persist in college, with obvious consequences for completion.</p> <p><u>Evidence</u>: Although some researchers have addressed the relationship between the affordability of tuition and postsecondary enrollment patterns, the findings are, for the most part, mixed (Kerkvliet & Nowell, 2000). For example, some researchers have found a direct association (Bean & Metsner, 1985), and others an indirect association, between tuition costs and enrollment (Wetzel, 1999) with higher tuition costs predicting lower likelihood of degree completion. Others have found these associations to be ambiguous—suggesting that educators should be aware of the potential effects of tuition increases on student persistence (Chressanthi, 1986). Interestingly, students who do not receive financial aid are just as likely to complete a bachelor’s degree as those who do receive aid, indicating that once enrolled, external funding does not influence outcomes (Cuccaro-Alamin, 1997). However, students in sub-baccalaureate institutions who receive aid are more likely to attain a degree or a certificate.</p>

Table 12
Improvement Strategies for Postsecondary Completion (2P1)

Improvement Strategy	Root Causes Addressed	What the Literature Says
<p>Increasing academic rigor at the high school level</p>	<ul style="list-style-type: none"> ❑ Academic preparation in high school ❑ Remedial coursework ❑ Patterns of postsecondary enrollment ❑ Students' academic and social integration 	<p><u>Theory and Models:</u> Students who are given a solid, secondary academic foundation are more likely to enter college ready to learn.</p> <p><u>Evidence:</u> Strategies for improving students' academic background include ensuring that all students are exposed to a core set of academic curricula (Southern Regional Education Board 2000); holding schools and students accountable for meeting core standards (U.S. Department of Education, 2002); reviewing school data to assess whether students are receiving the services they need (Northwest Regional Educational Laboratory, 2000); and integrating academic and career instruction to increase the academic exposure of students in vocational coursework (Grubb, 1995; Bailey, 1997; Brewer, 1999; Hoachlander, 1999).</p>
<p>Target services on high-risk populations</p>	<ul style="list-style-type: none"> ❑ Patterns of postsecondary enrollment ❑ Transfer ❑ Remedial coursework 	<p><u>Theory and Models:</u> Focusing services on individuals who are known to be at-high-risk of stopping out can ensure that students receive the extra assistance they may need to remain in school.</p> <p><u>Evidence:</u> Research points to the need for early intervention for students who are at risk for dropping out of a postsecondary institution (Jones & Watson, 1990). Timely intervention is especially critical to the postsecondary success of first-generation, low-income, minority students who have a lower likelihood of completing college in comparison to White students (Wilds & Wilson, 1998). Federal interventions, such as the TRIO programs, provide opportunities for at-risk students from the pre-college to the postsecondary level. Features of these programs include the following: intensive college preparation through advising, counseling, instruction, and tutoring on college campuses, in after-school programs, and in summer programs; participation in college admissions activities and workshops; a focus on computer technology, science, and mathematics in preparation for college entrance examinations and majors in these areas; admissions counseling, financial aid, and scholarships; and, providing tutoring, advising, developmental instruction, and other services to students who are currently attending college until they earn their baccalaureate degree (Martin, 1999; Muraskin, 1997).</p>
<p>Provide scholarships or tuition assistance</p>	<ul style="list-style-type: none"> ❑ Patterns of postsecondary enrollment ❑ Labor force participation and wages 	<p><u>Theory and Models:</u> Providing adequate financial assistance to students helps them meet the high cost of a postsecondary education, and significantly increases the likelihood of completing a college degree.</p> <p><u>Evidence:</u> Even though some researchers have questioned the direct link between financial assistance and degree completion, the research clearly indicates that financial support helps keep students in college, which, in turn, leads to a better graduation rate (Arnold, 1999; Perna, 1998). A financial aid package that</p>

Improving Performance on Perkins III Core Indicators

Improvement Strategy	Root Causes Addressed	What the Literature Says
	<ul style="list-style-type: none"> ❑ Remedial coursework 	<p>combines work–study with grant aid is a particularly effective strategy for keeping students in college (Cabrera, Nora, & Castaneda, 1992). Loans also increase students’ likelihood of persistence by reducing the need to work full time and allowing students to carry a full course load (National Center for Education Statistics, 1998). Loan aid and grant aid have varying outcomes for low-income students: the earlier low-income students receive grant aid, the more likely they are to stay in college (General Accounting Office, 1995).</p>
<p>Provide student support networks</p>	<ul style="list-style-type: none"> ❑ Academic and social integration 	<p><u>Theory and Models:</u> Students who lack connections within school require external assistance, in the form of guidance and support, to smooth their transition into postsecondary education.</p> <p><u>Evidence:</u> Research on colleges’ efforts to increase academic integration has found that a number of services are positively correlated with this goal, including advising, counseling, and mentoring; student–teacher relationships; quality of teaching; and academic support services available to students (Campbell & Campbell, 1997; Dale & Zych, 1996; Johnes, 1997). However, one study found that academic integration efforts in the form of increased advising and mentoring were not effective in increasing retention in postsecondary institutions, regardless of the type of institution (Kerkvliet & Nowell, 2000).</p>

References

- Adelman, C. (1999). *Answers in the tool box: Academic intensity, attendance patterns, and Bachelor's degree attainment*. Washington, DC: U.S. Department of Education.
- Arnold, A. (1999). *Retention and persistence in postsecondary education: A summation of research studies*. Texas Guaranteed Student Loan Corporation.
- Astin, A. A. (1997). How good is your institution's retention rate? *Research in Higher Education*, 38(6), 647–658.
- Bailey, T. (1997). *Integrating academic and industry skill standards (MDS-1001)*. Berkeley: National Center for Research in Vocational Education, University of California.
- Bean, J. A. (1983). The application of a model of turnover in work organizations to the student attrition process. *Review of Higher Education*, 6, 129–148.
- Bean, J. A., & Metzger, B. (1985). A conceptual model of nontraditional undergraduate student attrition. *Review of Educational Research*, 55(4), 485–540.
- Bean, J. A. (1980). Why students leave: Insight from research. In D. Hossler and J. Bean (Eds.), *The strategic management of college enrollments*. San Francisco: Jossey-Bass.
- Brewer, J. A. (1999). *Integration of academic and occupational education in community/technical colleges*. ERIC digest. Los Angeles: ERIC Clearinghouse for Community Colleges. (ED425786)
- Cabrera, A. F., Nora, A., & Castaneda, M. B. (1992). The role of finances in the persistence process: A structural model. *Research in Higher Education*, 33(5), 571–593.
- Campbell, T., & Campbell, D. (1997). A faculty/student mentor program: Effects on academic performance and retention. *Research in Higher Education*, 38(6), 727–742.
- Chressanthis, G. A. (1986). The impacts of tuition rate changes on college undergraduate headcounts and credit hours over time: A case study. *Economics of Education Review*, 5(2), 205–217.
- Cuccaro-Alamin, S. (1997). *Postsecondary persistence and attainment*. Washington, DC: National Center for Education Statistics, U.S. Department of Education.
- Dale, P., & Zych, M. (1996). A successful college retention program. *College Student Journal*, 30(3), 354–360.
- Day, J., & Curry, A. (1996). *Educational attainment in the United States*. Current Population Reports, U.S. Department of Commerce.
- General Accounting Office. (1995). *Higher education: Restructuring student aid could reduce low-income student drop-out rate*. Washington, DC: U.S. Government Printing Office.
- Grubb, W. N. (1995). A continuum of approaches to curriculum integration. In W. N. Grubb (Ed.), *Education through occupations in American high schools* (Vol. 1, pp. 59–81). New York: Teachers College Press.

Improving Performance on Perkins III Core Indicators

- Hanniford, B. E. & Sagaria, M. D. (1994, April). The impact of work and family roles on associate and baccalaureate degree completion among students in early adulthood. Paper presented at the 1994 Annual Meeting of the American Educational Research Association, New Orleans, LA. (ERIC Document Reproduction Service No. ED370520)
- Hoachlander, G. (1999, September). Integrating academic and vocational curriculum—Why is theory so hard to practice? CenterPoint, Number 7. Berkeley, CA: National Center for Research in Vocational Education.
- Horn, L. J., and Kojaku, L. (2001). High school academic curriculum and the persistence path through college. NCES 2001163. Washington, DC: U.S. Department of Education.
- Johnes, J. A. (1997). Inter-university variations in undergraduate completion rates: A statistical analysis by subject of study. *Journal of Applied Statistics*, 24(3), 343–361.
- Jones, D., & Watson, B. C. (1990). “High risk” students in higher education: Future trends. ERIC Digest. ED325033 HE 023 950
- Kerkvliet, J., & Nowell, C. (2000). An integrated approach to university student retention: Theory and evidence. Working Paper, Department of Economics, Oregon State University.
- Marcus, R. A. (1989). Freshman retention rates at U.S. private colleges: Results from aggregated data. *Journal of Economic and Social Measurement*, 15, 37–55.
- Martin, S. A. (1999). Early intervention program and college partnerships. ERIC Digest ED435383
- Mohanty, M., & Finney, M. (1997). Evidence on the effect of young adults’ wages on their college attendance decisions. *Applied Economics Letters*, 4, 733–735.
- Muraskin, L. (1997). Best practices in student support services: A study of five exemplary sites. Rockville, MD: Westat.
- National Center for Education Statistics. (1998). Postsecondary financing strategies: How undergraduates combine work, borrowing, and attendance. U.S. Department of Education. Washington, DC: U.S. Government Printing Office.
- Perna, L. W. (1998). The contribution of financial aid to undergraduate persistence. *Journal of Student Financial Aid*, 28(3), 15–40.
- Southern Regional Education Board. (2000). Making schools work: Raising student achievement in rural middle grades and high schools. Atlanta, GA.
- Tinto, V. (1993). Leaving college: Rethinking the causes and cures of student attrition. 2nd Edition. Chicago, IL: University of Chicago Press.
- Wetzel, J. (1999). Factors affecting student retention probabilities: A case study. *Journal of Economics and Finance*, 23(1), 45–55.
- Wilds, D., & Wilson, R. (1998). Minorities in higher education. 1997–1998 16th Annual Status Report. Washington, DC: American Council on Education, Office of Minority Concerns.
- U.S. Department of Education. (2000a). The Condition of Education. Washington, DC: National Center for Education Statistics.
- U.S. Department of Education. National Center for Education Statistics. (2000b). Low-income students: Who they are and how they pay for their education, NCES 2000–169, by Susan Choy. Project Officer: Larry Bobbitt.

U.S. Department of Education (2002). Strategic plan 2002–2007. Washington, DC: U.S. Department of Education.

Yap, K., Aldersebaes, I., Railsback, J., Shaughnessy, J. and Speth, T. (2000). Evaluating whole-school reform efforts. Portland, OR: Northwest Regional Educational Laboratory.

**Chapter 5. Perkins III Core Indicators:
Secondary Placement (3S1), Postsecondary Placement and Retention (3P1 & 3P2)**

Table 13
Root and Indirect Causes for Transition (3S1, 3P1, 3P2)

Root (Direct) Causes	What the Literature Says
<p>Student awareness of opportunities and consequences of decisions</p>	<p><u>Theory</u>: Students do not have sufficient awareness of the career opportunities and knowledge of the consequences of career decisions to effectively manage career transitions, including further education and employment decisions. Many students have given little thought to a career choice when they graduate from high school. Indeed, there is anecdotal evidence that a growing number of college students have only a vague idea about what they want to do after graduation. There can be positive aspects to this ambiguity, if these students acquire the tools that are needed to continue to learn (Baily, 2002), and have not shut off too many possible paths by their failure to decide and prepare. But, students may be unlikely to make the effort to acquire these “career option” skills if they see no clear connection between that investment and an attractive payoff.</p> <p>Students need valid and reliable information about the cause-and-effect relationship between the decisions they make and the transition paths that will remain open and accessible. If such information is not provided, why should students not conclude that these chains of sequential cause-and-effect pairings are not known? And, worse yet, if students know from other sources that the “official” cause-and-effect education/employment/career/income relationships are inconsistent with the facts, what response should be expected? “Stay in school? My older brother enrolled in the local community college, but was told that he needed remedial coursework that would take a year-and-a-half to complete before he could even begin to take credit classes.” “Spend the money to get a certificate? My friend did that, and couldn’t find a job that used what she learned because of the recession and consolidation of local health care providers.” Students can be informed in many ways that life chances are based on probabilities. The probability of a successful journey can be improved, but a timely arrival at the chosen destination cannot be ensured. The pairing of theory and evidence is strong enough to advise students not to ignore what is known about the probabilities of succeeding. At the same time, it is true that too little is known about what really matters.</p> <p><u>Evidence</u>: Unfortunately, no consensus has developed in support of a single theory of the transition process. This failure to converge on one theory can be traced to weak tests of competing theories. The tests have been deficient because reliable data appropriate to conduct the tests have been scarce. Collection and maintenance of longitudinal data files is expensive. Respondent willingness to provide necessary information deteriorates. Administrative data sources often fall short of the quality threshold needed for statistical use.</p>

Root (Direct) Causes	What the Literature Says
	<p>The transition “journey” does begin before high school graduation (Haggstrom, Blaschke, & Shavelson, 1991). Early decisions, and then uncontrollable events that occur along the way, have a cumulative effect on the range of placement options that remains viable as the transition progresses (Plank & Jordan, 2001; Miller, 2001; Gruber, 2001; Rouse, 1994). A time-series of cause-and-effect pairings reveals path dependence (Ryan, 1999). Some of today’s options are limited by what has gone before, and today’s decisions and events will define tomorrow’s possibilities. “A significant determinant of the well-being of many older persons will be the risky decisions that they made as youths” (Gruber). “Tying academic performance to clear consequences for students may help support attainment based on factors other than teachers’ expectations or students’ family background” (Schiller & Muller, 2000).</p> <p>Something is known about transition flows, but much less than is wanted and needed to provide students with valid and reliable information. Concurrent enrollment and employment, and the quality of this employment, affect student goal setting, expectations about future employment opportunities, and the importance of continued education to gain access to these opportunities. Differences among types of work and workplaces continue to expand (National Academy of Sciences, 1999). This increases the difficulty of improving student awareness of opportunities, and linking these opportunities to decisions made now. “Through experiences in the three different settings—high school, community college, and laboratory workplaces—students learned that each setting had different expectations” (Ryken, 2001). This is a critical point—the resource constraints and priorities for their use are fundamentally different in schools than in the workplace. The usefulness of “off-the-shelf” information about skill <i>requirements</i> continues to fade in many workplaces. Each business enterprise operates with its own rules, and these rules respond to changing opportunities and threats that discourage unflinching commitment to traditional ways of doing business (Baily, 2002).</p> <p>“Women are deeply engaged in the educational process, while the boys are stuck where they were decades ago...Nobody really knows why this is the case, though theories abound” (Fletcher, 2002). “Even today the fraction of male high school seniors who enter college immediately after graduation is not much higher than it was in 1968” (Card & Lemieux, 2001). “Young people are too isolated from the adult world to see the connection between school and work” (Silberman, 1994). “The development of industry [skill] standards offers an opportunity for employers to become more involved with the education reform process. In turn, the support of employers could strengthen the political position of schools and provide incentives for students to work hard” (Bailey & Merritt, 1997).</p> <p>“The sum total of progress in restructuring the transition is meager. In some areas, we have regressed rather than progressed. Thus, this is an odyssey of some promising beginnings that did not, for the most part, continue” (Barton, 1994; Law, Knuth, & Bergman, 1992). “In contrast to this desired state of affairs for transition from school to work, the current state in the United States can at best be described as an agglomeration of programs and individual experiences” (Pease & Copa, 1994). “Nationally, only about 8% of high school seniors get jobs through high school job assistance” (Rosenbaum, De Luca, Miller, & Roy, 1999). “An individual’s first job has long-term effects on their occupational trajectory” (Arum & Hout, 1998).</p>

Root (Direct) Causes	What the Literature Says
<p>Student opportunity to respond to improved awareness</p>	<p><u>Theory</u>: Students do not have the same opportunities to act on improved awareness because of differential access to high-quality and affordable education and training opportunities with their communities. A complicated theory and sophisticated evidence is not needed to convince even casual observers that secondary and postsecondary offerings differ by location, other accessibility criteria such as cost and prerequisites, and quality. Students do not have an equal chance to pursue their dreams where they live, and go to school, and to obtain reliable documentation of academic knowledge and occupational skills attained. Given this fact, it is important to engage in triage decisions. What can be done with available resources (see the next section—“Causes Outside Control for Transition”) to prepare students to take a next step toward their goal, elsewhere if necessary?</p> <p><u>Evidence</u>: Differential access to educational opportunities and to jobs offering continued learning opportunities has been documented in many ways (Howell & Peterson, 2002; Bernhardt, Morris, Handcock, & Scott, 2001; Southern Regional Education Board, 2002; Barton, 2001).</p>
<p>Employer awareness of student availability and qualifications</p>	<p><u>Theory</u>: The “certification,” “screening,” or “signaling” models hold that employers use available information based on their own experience, or that of other trusted sources, to sort candidates for employment into preferred, less-preferred, and rejected groupings. This model differs from the basic “human capital” model, which holds that individuals embody certain levels of productive capacity that is independent of the work setting. Variations of the signaling model emphasize a sorting criterion based on how a candidate is expected to interact with other employees in an interdependent team setting, and a candidate’s capacity for continued learning (Sanchez Santos-Laanan, 1998). Early decisions and investments in education create an unobserved “option” value (Haveman & Wolfe, 1984), but temporary or permanent “scarring” can occur (Ryan, 1999). Employers have different capabilities and approaches for locating potential employees and determining their qualifications, which will, in turn, affect transition opportunities for students. Employers want to minimize the combined costs of recruitment and subsequent training of new-hires, so a premium is placed on access to low-cost ways to know about the availability of highly qualified candidates (Bassi & Ludwig, 2000). Employers discriminate among candidates—they screen and sort based on a limited number of criteria, some of which are subjective and unique to a particular business or decisionmaker. Every employer and admissions officer stereotypes, based on their own previous experience or on other sources of information. Each candidate is assigned a “more favored” or “less favored” ranking.</p> <p><u>Evidence</u>: Continuing expansion of diversity in academic knowledge, occupational skills, and demographics in many locales increases the difficulty employers encounter in screening possible candidates for employment (National Academy of Sciences, 1999).</p>
<p>Employer opportunity to take advantage of improved awareness</p>	<p><u>Theory</u>: Employers provide different employment opportunities (e.g., compensation, promotion paths) that have an effect on student transitions. Few employers remain insulated from competitive forces. Competition, or the threat of competition, limits each employer’s ability to “pay what it takes” to hire a preferred candidate. Some employers respond to this realization by adopting a conscious policy of investing little in employee recruitment and training, believing they’re already destined for a high rate of employee turnover. A competitor may pay less at the outset, but invest more in on-the-job training, combined with selective promotions, raises, and bonuses that are strategically designed to retain better-performing employees who show promise.</p>

Root (Direct) Causes	What the Literature Says
	<p>Students have a limited capacity to see beyond immediate options—take this job or a different one, or continue in school? Entry-level wage rate can be a poor signal of which openings might contribute the most to a student’s continued learning and competitive value in later years. Low tuition or easy grading might be enticing, but can prove unfortunate later. The more students know about these differences when they begin to make transition decisions, the more likely each will be to avoid dead-end opportunities, and instead select continued learning alternatives. Of course, to be chosen, each student has to be the best available candidate; and, once chosen, has to be willing to accept the terms offered or perhaps negotiate within a very limited range that will not jeopardize their ranking as the best overall choice.</p> <p><u>Evidence:</u> Employers in the same industry and location offer different compensation mixes. These employers experience different turnover patterns. They have different internal labor markets; that is, they have adopted different promotion paths and training opportunities. There is substantial heterogeneity in the staffing configurations of businesses that many of us think of as being alike. This is just as true in information technology businesses as in health care facilities (Institute on Education and the Economy, forthcoming; Mortensen & Hinds, 2002; Zabusky & Barley, 1996; Stevens, 2002; Burgess, Lane, & Stevens, 1996).</p>

Table 14
Causes Outside Control for Transition (3S1, 3P1, and 3P2)

External Conditions/ Constraints	What the Literature Says
<p>Family and peer educational attainment and work experience</p>	<p><u>Theory:</u> What students are told about transition opportunities and the cumulative consequences of decisions and uncontrollable events is filtered through diverse or missing family, household, neighborhood, and social network examples of a dependable path from educational attainment to future opportunity. If students do not see someone “like” them having succeeded by following a prescribed path, they will be less likely to exert effort and have high aspirations in managing educational and career transitions.</p> <p><u>Evidence:</u> Research suggests that negative peer pressures and the lack of family and network examples will reduce effort and dampen aspirations. “If the preponderance of negative images and peer pressures undermines the educational performance of blacks and Hispanics, as the blocked-opportunities perspective suggests, why does it not similarly dampen aspirations? If the pressure Asian parents put on their children yields high educational attainments, are there adverse consequences on self-esteem and mental health among adults?” (Kao & Tienda, 1998). “The relatively slow growth in educational attainment . . . may well have an ‘echo effect’ on these cohorts’ children, slowing down the rate of growth of human capital in the U.S. economy for decades into the future” (Card & Lemieux, 2001). “The good news is that the relationship of ability to college entry was about twice as strong as was that for socioeconomic status (SES), although there was still a strong association of socioeconomic status with college entry at every ability level” (Nichols, 1994). Similar findings have been reported in other research (Munger, 2002).</p>

External Conditions/ Constraints	What the Literature Says
<p>Availability of employment opportunities</p>	<p><u>Theory</u>: Engagement in work while in school is related to the ease of access to employment opportunities, which influences goal setting and expectations about future employment opportunity. Availability of employment as a source of income while enrolled in postsecondary education influences whether and where students enroll and are able to persist to completion of the curriculum selected. Also, availability of employment will affect the likelihood that students can gain and retain employment after leaving secondary or postsecondary education.</p> <p><u>Evidence</u>: Research evidence is widely available on the impact of employment opportunities (e.g., Institute on Education and the Economy, forthcoming; Bishop, Bishop, Gelbwasser, Green, & Zuckerman, 2002).</p>
<p>Employer attitudes with respect to gender, race/ethnicity, and other demographic characteristics</p>	<p><u>Theory</u>: Employer attitudes toward gender, race/ethnicity, and other demographic characteristics will result in different opportunities for students in managing education and career transitions.</p> <p><u>Evidence</u>: Controversy continues about the importance of gender, race/ethnicity, and other demographics in employer hiring, retention, and promotion decisions (Moss & Tilly, 2001), but few describe these as irrelevant. Credentials should not be considered a completely insurmountable barrier (Moss & Tilly). Traits that count in some jobs might not count in others. Additionally, the same traits may count differently for men and women, or for different ethnic or language groups (Bowles, Gintis, & Osborne, 2001). Although women were more likely to persist in higher education and tend to obtain higher grades than men, their average earnings and occupational status at age 32 are still considerably below those of their male counterparts (Nichols, 1994). The William T. Grant Foundation Commission on Work, Family, and Citizenship consistently underscored the importance of identifying differences among individuals and groups, the necessity of responding to them flexibly and creatively, and the potential of many kinds of variation as strengths to be exploited and celebrated” (Melaville, 1994).</p>

Table 15
Improvement Strategies for Transition (3S1, 3P1, and 3P2)

Improvement Strategy	Root Causes Addressed	What the Literature Says
<p>Widen and deepen student awareness of opportunities and the consequences of decisions</p>	<p>❑ Student awareness of opportunities and consequences of decisions</p>	<p><u>Theory and Models:</u> Improvement of student <i>awareness of transition opportunities and consequences of decisions</i> is a preferred action strategy because it is evidence-based and does not attempt to “engineer” the paths taken. Instead, the choice of path remains with the student, who now has a more solid basis for mapping and setting out on a chosen route.</p> <p>Continued use of the traditional concept of a career “ladder” as a descriptor of how the transition journey will progress for most students is unfortunate (Stevens, 2001). Few students know what they want to do. Some who know, or think they know, will not acquire the qualifications needed to succeed. Others will change their mind. The concept of a career ladder suggests to students that it is possible to “engineer” their transition. But, in most cases, it is not know how. Occupational skill requirements change, sometimes quite rapidly and repeatedly, as new technologies become available and labor demand and supply imbalances oscillate.</p> <p>A new approach to student counseling should be introduced. The rigid vertical career “ladder” should be downplayed as a likely transition path to be followed. The replacement concept should be a career “wall” (Stevens, 2001). Each student’s future opportunities can be visualized as a climbing wall, like the ones that are found in athletic facilities and other recreational venues. This will help students understand that there are often multiple paths to a chosen destination. Different routes can be taken, depending upon many factors—some of which can be controlled, while others cannot. Lateral, and even descending, moves might be the best strategy in some cases; sustained direct ascent is not always wise.</p> <p>The wall approach will allow students to understand that the hand- and foot-holds are moved around, or removed entirely, to modify the challenge faced; the transition path counterparts are the changing of skill requirements, and the appearance and disappearance of entire occupations. The wall can be used to engage students in considering of the role of a safety net and time limit, just as each might affect a climbing strategy. The rules for climbing can be opened for discussion. What should each attempt cost, and who should pay what amount? What should happen when a fast climber overtakes a slower climber; should some paths be reserved for those who are more agile? If so, what are some of the consequences of the adopted rules? Are these “fair” and acceptable? These, and other embellishments, encourage students to think strategically about their approach to the wall.</p>

Improvement Strategy	Root Causes Addressed	What the Literature Says
		<p>The career ladder offers little influential help, but the career wall does. Students can more easily identify climbers “like” them on the wall than on many narrow vertical paths. And, in many cases, they can see for themselves that you can start toward one goal, but then shift to another goal through a series of intermediate lateral, and perhaps backwards, moves, before renewing the ascent toward a new destination.</p> <p>The return-on-investment in further education will not be uniform for all aspirants. Opportunities to continue to learn on the job will not be uniform across all entry-level openings. Can dead-end paths be identified, so delays in advancement can be avoided? When does delay become a fatal mistake that cannot be corrected? What behaviors contribute to irreversible barriers to further progress? Should anyone be denied access to the wall? If so, is there agreement on the criteria for such denial?</p> <p>By adding descriptive accuracy to the career wall, students can be introduced to valid and reliable indicators of where various predecessors are in their climb. Who has advanced and who has not? Who does not even appear on the career wall? Who repeatedly tries to climb, but fails? Who has followed a path that could have been predicted by their stated goal at an earlier time? Who has followed a meandering, or seemingly haphazard, route, but appears to have made substantial progress? What, by the way, defines “progress”? Is there a common denominator of what students seek? Is it money, security, job satisfaction, power, fame, advancement opportunity, a chance to control one’s own destiny? If there is not a common denominator, the difficulty of modeling behavior is multiplied many times over.</p> <p>A challenge faced in adopting this new approach to student counseling is that today descriptors of the climbing wall are meager. We know the career ladder is not helpful in an increasing number of applications, but the descriptors needed to substitute a clear understanding of paths on the wall are not available. This is a basic reason why competing theories of transition persist.</p> <p>Warning: there is a possible risk when students become aware that multiple paths can be taken to reach a chosen destination. Some may decide that today’s decisions do not matter, or do not matter much. This conclusion can be discouraged through the presentation of valid and reliable indicators of fatal error (i.e., irreversible dead-ends), or costly error, such as required enrollment in remedial coursework before acceptance for postsecondary credit courses.</p>

Improvement Strategy	Root Causes Addressed	What the Literature Says
		<p><u>Evidence</u>: The career wall concept has not been fully implemented and evaluated for secondary and postsecondary student transitions.</p>
<p>Expand student connections to work and careers</p>	<p>❑ Student awareness of opportunities and consequences of decisions</p>	<p><u>Theory and Models</u>: Students who are given the opportunity to explore career and educational opportunities and gain work experience are more likely to make successful transitions.</p> <p><u>Evidence</u>: Recent reviews of school-to-work interventions, including career-related academics, comprehensive career development activities, and paid or unpaid work experience linked to school, suggests benefits for students, teachers, and participating employers (Hughes, Bailey, & Mechur, 2001). However, the research findings on the effects of part-time employment are mixed” (Silberman, 1994).</p>
<p>Widen and deepen employer awareness of student availability and qualifications</p>	<p>❑ Employer awareness of student availability and qualifications</p>	<p><u>Theory and Models</u>: Educators and other intermediaries can assist students by making employers aware of student availability and making sure that the presentation of student qualifications match the selection criteria used by employers. Schools and colleges can provide direct recruitment and hiring services through placement offices and job fairs, and by increasing faculty involvement in student placement.</p> <p><u>Evidence</u>: Employer interest in student qualifications is addressed in current research and various proposals on improving student qualifications (Bishop et al., 2002; Carnevale & Desrochers, 2001; Scans 2000, 2003).</p>

References

- Arum, R., & Hout, M. (1998). The Early Returns: The Transition from School to Work in the United States. In Y. Shavit & W. Muller (Eds.), *From School to Work: A Comparative Study of Educational Qualifications and Occupational Destinations*. New York: Clarendon Press.
- Baily, M. N. (2002). The New Economy: Post Mortem or Second Wind? *Journal of Economic Perspectives*, 16 (2–spring), 3–22.
- Bailey, T. & Merritt, D. (1997). Industry Skills Standards and Education Reform. *American Journal of Education*, 105, 401–436.
- Barton, P. E. (1994) Odyssey of the Transition From School to Work 1960–1990. In A.J. Pautler (Ed.), *High School to Employment Transition: Contemporary Issues*. Ann Arbor, MI: Prakken, pp. 3–12.
- Barton, P. E. (2001). Facing the Hard Facts in Education Reform. Princeton, NJ: Educational Testing Service. Retrieved from <http://www.ets.org/research/pic>
- Bassi, L. J., & Ludwig, J. (2000). School-to-Work Programs in the United States: A Multi-Firm Case Study of Training, Benefits, and Costs. *Industrial and Labor Relations Review*, 53, 219–239.
- Bernhardt, A., Morris, M., Handcock, M. S., & Scott, M. A., (2001). Divergent Paths: Economic Mobility in the New American Labor Market. New York: Russell Sage Foundation.
- Bishop, J. H., Bishop, M., Gelwasser, L., Green, S., & Zuckerman, A. (2002). Why do we Harass Nerds and Freaks: Towards a Theory of Student Culture and Norms? In Diane Ravitch (Ed.), *Brookings Papers on Education Policy*. Washington, DC: The Brookings Institution.
- Bowles, S., Gintis, H., & Osborne, M. (2001). The Determinants of Earnings: A Behavioral Approach. *Journal of Economic Literature*, 39, 11 -11 .
- Burgess, S., Lane, J., & Stevens, D. (1996). Job Flows and Worker Flows: Issues and Evidence from a Panel of U.S. Firms. In Ronald Schettkat (Ed.), *The Flow Analysis of Labour Markets*. New York: Routledge, pp. 96–114.
- Card, D. & Lemieux, T. (2001). Dropout and Enrollment Trends in the Postwar Period: What Went Wrong in the 1970s? In J. Gruber (Ed.), *Risky behavior among youths: An economic analysis*. Chicago: The University of Chicago Press.
- Carnevale, A. P., & Desrochers, D. M. (2001). Help Wanted . . . Credentials Required: Community Colleges in the Knowledge Economy. Washington, DC: Educational Testing Service and American Association of Community Colleges. Retrieved from <http://www.ets.org/research/dload/AACCHelp.pdf>
- Fletcher, M. A. (2002). Degree of Separation: Gender Gap Among College Graduates Has Educators Wondering Where the Men Are. *The Washington Post*. June 25, 2002, A1 and A10.
- Haggstrom, G. W., Blaschke, T. J., & Shavelson, R. J. (1991). After high school, then what? A look at the postsecondary sorting-out process for American youth. Santa Monica, CA: RAND.
- Haveman, R. H., & Wolfe, B. L. (1984). Schooling and economic well-being: The role of nonmarket factors. *Journal of Human Resources*, 19, 377–407.

Improving Performance on Perkins III Core Indicators

- Heckman, J. J. (1996). What Should Be Our Human Capital Investment Policy? In G. Mangum, & S. Mangum (Eds.), *Of Heart and Mind: Social Policy Essays in Honor of Sar A. Levitan*. Kalamazoo, MI: W. E. Upjohn Institute for Employment Research.
- Howell, W. G., & Peterson, P. E. (2002). *The Education Gap: Vouchers and Urban Schools*. Washington, DC: The Brookings Institution.
- Hughes, K. L., Bailey, T. R., & Mechur, M. J. (2001). *School-to-Work: Making a Difference in Education: A Research Report to America*. New York: Institute on Education and the Economy, Teachers College, Columbia University. Retrieved from <http://www.tc.columbia.edu/iee>
- Institute on Education and the Economy (forthcoming). *Work-Based Learning and Education Reform*. New York: Columbia University, Teachers College. Retrieved from <http://www.tc.columbia.edu/~iee.school.htm>
- Kao, G., & Tienda, M. (1998). Educational Aspirations of Minority Youth. *American Journal of Education*, 106, 349–384.
- Law, C., Knuth, R. A., & Bergman S. (1992). What Does Research Say About School-to-Work Transition? Oak Brook, IL: North Central Regional Educational Laboratory. 24 pp. Retrieved from http://www.ncrel.org/sdrs/areas/stw_esys/7sch2wrk.htm
- Melaville, A. (1994). Forgotten No More: The Contribution of the William T. Grant Foundation Commission Reports on Non-College Youth and the Transition from School to Employment. In A. J. Pautler (Ed.), *High School to Employment Transition: Contemporary Issues*. Ann Arbor, MI: Prakken, pp. 13–22.
- Miller, M. S. (2001). Finding Common Ground: Local Intermediaries and National Industry Associations. Issue Brief. Boston, MA: Jobs for the Future, 1–13
- Mortensen, M., & Hinds, P. J. (2002). *Fuzzy Teams: Boundary Disagreement in Distributed and Colocated Teams*. Cambridge, MA: Massachusetts Institute of Technology Press.
- Moss, P., & Tilly, C. (2001). *Stories Employers Tell: Race, Skill, and Hiring in America*. New York: Russell Sage Foundation.
- Munger, F. (Ed.). (2002). *Laboring Below the Line: The New Ethnography of Poverty, Low-Wage Work, and Survival in the Global Economy*. New York: Russell Sage Foundation.
- National Academy of Sciences (1999). *The Changing Nature of Work*. Washington, DC: National Academy Press.
- Nichols, R. C. (1994). The National Longitudinal Studies: A Window on the School-to-Employment Transition. In A. J. Pautler (Ed.), *High School to Employment Transition: Contemporary Issues*. Ann Arbor, MI: Prakken, pp. 49–60.
- Pautler, A. J., Jr. (Ed.). (1994). *High School to Employment Transition: Contemporary Issues*. Ann Arbor, MI: Prakken.
- Pease, V. H., & Copa, G. (1994). Partnerships in the School-to-Work Transition. In A. J. Pautler (Ed.), *High School to Employment Transition: Contemporary Issues*. Ann Arbor, MI: Prakken, pp. 243–256.
- Plank, S. B., & Jordan, W. J. (2001). Effects of information, guidance, and actions on postsecondary destinations: A study of talent loss. *American Educational Research Journal*, 38(4), 947–979.
- Rosenbaum, J. E., DeLuca, S., Miller, S. R., & Roy, K. (1999). Pathways Into Work: Short- and Long-Term Effects of Personal and Institutional Ties. *Sociology of Education*, 72, 179–196.

- Rouse, C. (1994). What to do after high school? The two-year vs. four-year college enrollment decision. In R. Ehrenberg (Ed.), *Contemporary Policy Issues in Education*. Ithaca, NY: ILR Press.
- Ryan, P. (1999). The school-to-work transition twenty years on: issues, evidence and conundrums. OECD. *Preparing Youth for the 21st century: Issues, evidence, and conundrums*. Paris:FR, 437–458.
- Ryken, A. E. (2001). Community College Students' Perspectives on Schooling and Scientific Work, 1–53.
- Sanchez, J. R., & Santos-Laanan, F. (1998). Economic Benefits of a Community College Education: Issues of Accountability and Performance Measures. In J. R. Sanchez & F. Santos-Laanan (Eds.), *Determining the Economic Benefits of Attending Community College*. New Directions for Community Colleges, 104, San Francisco: Jossey-Bass.
- SCANS 2000. The Workforce Skills Website. Baltimore, MD: The Johns Hopkins University, Institute for Policy Studies. Retrieved from <http://www.scans.jhu.edu>
- Schiller, K. S., & Muller, C. (2000). External Examinations and Accountability, Educational Expectations, and High School Graduation. *American Journal of Education*, 108, 73–102.
- Silberman, H. F. (1994). Research Review of School-to-Employment Experience. In A. J. Pautler (Ed.), *High School to Employment Transition: Contemporary Issues*. Ann Arbor, MI: Prakken, pp. 61–72.
- Southern Regional Education Board (2002). *Opening Doors to the Future: Preparing Low-achieving Middle Grades Students to Succeed in High School*. Atlanta, GA. Retrieved from <http://www.sreb.org>
- Stevens, D. (2001). Getting a Job is a First Step: What Should Follow? Washington, DC: U.S. Department of Labor, Office of Workforce Security, Division of Research and Reporting, pp. 1–20.
- Stevens, D. (2002). Labor Market Dynamics: One Component of an Integrated System of Labor Market Information. Washington, DC: Workforce Information Council c/o Bureau of Labor Statistics, U.S. Department of Labor. Retrieved from <http://www.workforceinfocouncil.org/documents/LaborMarketDynamicsConceptPaper.doc>
- Stevens, D. W. (1994). Experiences of High School Graduates in Finding Employment. In A. J. Pautler (Ed.), *High School to Employment Transition: Contemporary Issues*. Ann Arbor, MI: Prakken, pp. 73–84.
- Zabusky, S. E., & Barley, S. R. (1996). *Redefining success: Ethnographic observations on the careers of technicians*. Palo Alto, CA: Stanford University, Center for Work, Technology & Organization.

Chapter 6. Perkins III Core Indicators: Participation in Secondary and Postsecondary Non-Traditional Programs (4S1 and 4P1)

Table 16
Root and Indirect Causes for Nontraditional Participation (4S1 and 4P1)

Root (Direct) Causes	What the Literature Says
<p>Career guidance materials and practices</p>	<p><u>Theory</u>: Gender-biased career guidance practices can deter students from participating in nontraditional training programs.</p> <p><u>Evidence</u>: Interest inventories and aptitude assessments are often used by guidance personnel to assist students in selecting career-related coursework or majors in college. The Armed Services Vocational Aptitude Battery contains sections based on exposure to subject, instead of aptitude. For example, one section tests knowledge of automotive components, systems, tools, and repairs—a subject to which women have little exposure (General Accounting Office, 1999). Career counseling and recruitment that rely on gender stereotypes is still pervasive in the career and technical education system (National Women’s Law Center, 2002).</p>
<p>Access to and participation in math, science, and technology</p>	<p><u>Theory</u>: Participation and success in math, science, and technology courses are gateways for participation in nontraditional careers for women.</p> <p><u>Evidence</u>: Female students do not have higher levels of math anxiety than males until the late junior high school/early high school period, at which time females begin exhibiting more math anxiety than their male counterparts (Montclair State University, 1997; Reilly, 1992). Parents of females are more likely to report that mathematics is less important than other subjects, and more difficult for females. Girls do not come to the mathematics classroom with the same experiences as boys, and teachers call on boys an average of eight times more than they call on girls. A shrinking gender gap exists in standardized test results in mathematics, women are underrepresented in physics and engineering fields, and there is a new gender gap in technology (Gavin, 2000). Although the gender gap in advanced-placement computer-science test performance has narrowed significantly from 1984 to 1996, the percentage of women taking the examination has been consistently low (Stumpf & Stanley, 1997). In a recent study on the continuing female under-involvement in science, the following causes were found to be significant: teachers interact more often and in more detail with male students, who tend to be more aggressive; female students have a more difficult transition through adolescence than male students; science as a discipline discourages females; society undervalues the role of women, and sends mixed messages to females; and there is an overall denial of gender biases in the educational system (Graham 2001).</p> <p>Lack of participation of girls in mathematics and science classes limits participation of girls in registered apprenticeship programs for high-skill, high-wage occupations (University of Central Florida, 1998).</p>

Root (Direct) Causes	What the Literature Says
<p>Instructional strategies</p>	<p><u>Theory</u>: Teachers are generally unaware of subtle, and not so subtle, gender-biased instructional strategies that influence student participation and success in school.</p> <p><u>Evidence</u>: Subtlety and complacency mask ongoing gender bias in today’s classrooms (Sadker, 1999). In a national survey in 1993 and 1994, the most time spent on gender equity in schools of education was 2 hours per semester. One third of teacher education instructors surveyed spent 1 hour or less on the topic (American Institutes for Research, 1998).</p>
<p>Nontraditional role models</p>	<p><u>Theory</u>: Nontraditional role models are a significant factor in a student’s choice to pursue a nontraditional career.</p> <p><u>Evidence</u>: Interviews with women employed in trades revealed four significant factors that influenced their career choice: a perceived innate ability, a strong sense of self, a desire for independence, and access to role models—especially family members (Greene & Stitt-Gohdes, 1997). Role models can come from family, community, and the school. However, in a study with secondary school principals, nontraditional teacher role models were perceived more favorably for women than for men, limiting the potential for nontraditional male role models in schools (Rolling, 1996).</p>
<p>Early exposure</p>	<p><u>Theory</u>: To be effective, exposure to nontraditional careers needs to happen in elementary school.</p> <p><u>Evidence</u>: Recent research shows that early nontraditional experiences can have a lasting impact on women’s career decisions (Kerka, 2001). Gender stereotyping occurs early, and schools have the potential to impact those stereotypes. In a study comparing second and sixth graders, second graders had significantly higher sex-stereotyping scores (Billings, 1992).</p>
<p>Curriculum materials</p>	<p><u>Theory</u>: Visual images of individuals in nontraditional careers can positively impact student participation.</p> <p><u>Evidence</u>: Visual representation of working individuals in textbooks, displays, videos, and curriculum influence students gender stereotypes about career options. The way nontraditional careers are advertised and perceived has a significant impact on who pursues those opportunities (Kerka, 2001).</p>
<p>Occupational choice</p>	<p><u>Theory</u>: Exposure of women to high-skill/high-wage occupations has the potential to close the gender gap in annual and lifetime earnings.</p> <p><u>Evidence</u>: The most important variable affecting earnings of both genders was not education, but occupation. The implication was that narrowing the gender gap further would require breaking down gender barriers in certain high-paying occupations. Noble (1992) pointed out that to the majority of women, the relevant issue was being stuck on the “sticky floor” of low wage occupations. High school and postsecondary vocational–technical education has the potential to free women from that “sticky floor” by opening doors to high-skill/high-wage occupations (Gray, 1993).</p>

Root (Direct) Causes	What the Literature Says
Self-efficacy	<p><u>Theory</u>: The strength of a girl’s or woman’s self-efficacy (i.e., expectations or beliefs that one can successfully perform a given behavior) is directly related to the pursuit and achievement of a career that is compatible with her abilities. A weak or strong self-efficacy will also determine how a woman copes with and manages internal and external career-related barriers.</p> <p><u>Evidence</u>: In adult working women, high-ability women had a tendency to underestimate a number of their abilities, including their ability to learn and their verbal and spatial skills and aptitudes (Betsworth, 1997). Behavior and behavior change are mediated primarily by expectations of personal efficacy. Low self-efficacy may prevent an individual from attempting to perform a task even if he or she is relatively certain that performance of the task will lead to desired outcomes (Hackett & Betz, 1981).</p>
School climate	<p><u>Theory</u>: Students who are surrounded by a school environment supportive of nontraditional choices and who are exposed to nontraditional career options are more likely to select participation in nontraditional career areas.</p> <p><u>Evidence</u>: The American Association of University Women (AAUW) commissioned three reports on positive school climate for girls and the impact it can have on the achievement of girls. They recommended that the issues of gender equity be visible and integral to the public debate, which lends legitimacy to the issue and contributes to the success of girls (Research for Action, 1996).</p>
Student attitudes	<p><u>Theory</u>: Schools can impact student attitudes, biases, and stereotyping regarding their potential career aspirations.</p> <p><u>Evidence</u>: To change social attitudes about women’s needs and abilities regarding technology, El Paso Community College established the Women in Technology (WIT) program. The WIT program engaged in community outreach efforts, and more than doubled its female enrollment in technical fields after 10 years (DiBenedetto, 1999).</p>

Table 17
Causes Outside Control for Nontraditional Participation (4S1 and 4P1)

External Conditions/ Constraints	What the Literature Says
Family demographic characteristics	<p><u>Theory</u>: Family and personal demographic characteristics determine the gender (male or female), financial (household income), and cultural (race/ethnicity) background and biases that impact career choice.</p> <p><u>Evidence</u>: Traditional sex-role stereotyping is manifested in students who participate in a schools’ free lunch program, most of whom were male and Hispanic (Morgison, 1995). Girls with low socioeconomic-status parents have higher sex-stereotyping scores than girls with high socioeconomic-status parents, while boys with low socioeconomic-status parents have lower sex-stereotyping scores than boys with high socioeconomic-status parents. Neither family structure nor levels of parents’ education is significantly related (Billings, 1992).</p>

External Conditions/ Constraints	What the Literature Says
<p>Peer influence</p>	<p><u>Theory</u>: Peer influence is a significant factor in affecting a student’s course selection and career choice.</p> <p><u>Evidence</u>: For women, the influence of a significant other was a distinguishing factor between students who expected to enter a desired occupation and those who expected to enter occupations more traditional than they desired (Davey & Stoppard 1993). In contrast, enrollment in nontraditional courses tended to improve when students recruited their friends or participated in these courses in groups (Ingle, 2000).</p>
<p>Media representation</p>	<p><u>Theory</u>: Public image, media, and advertising impacts student’s consideration of or participation in nontraditional careers.</p> <p><u>Evidence</u>: The way nontraditional careers are advertised and perceived by the public has a significant impact on who pursues these opportunities (Kerka, 2001).</p>
<p>Wage potential</p>	<p><u>Theory</u>: Earnings potential has a positive influence on women considering nontraditional careers, and may be a negative influence on men considering nontraditional careers.</p> <p><u>Evidence</u>: This holds true for most nontraditional occupations, except nursing. Men choose nursing for many reasons, including job security and salary (Boughn, 1994). Salary is one of the factors of satisfaction for women entering nontraditional occupations (Stenberg, 1991).</p>
<p>Social attitudes</p>	<p><u>Theory</u>: Students develop biased attitudes about nontraditional careers from a variety of sources outside the school.</p> <p><u>Evidence</u>: In a survey of undergraduate students, women expected deviation from occupational gender stereotypes to be personally costly, whereas men did not (Yoder, 1996). Male students pursuing traditional careers tend to endorse toughness, homophobic attitudes, and restrictive emotionality, compared to male students pursuing nontraditional careers (Jome & Tokar, 1998).</p>

Table 18
Improvement Strategies for Nontraditional Participation (4S1 and 4P1)

Improvement Strategy	Root Causes Addressed	What the Literature Says
<p>Review career guidance materials and practices for gender bias and nontraditional exposure and support</p>	<ul style="list-style-type: none"> <input type="checkbox"/> Career guidance materials and practices <input type="checkbox"/> Occupational choice <input type="checkbox"/> Access to and participation in math, science, and technology 	<p><u>Theory and Models:</u> Gender-biased career guidance expectations and practices are a major barrier to student participation in non-traditional programs. One model approach is to use checklists to review career guidance practices (Wisconsin Model for Sex Equity in Career and Vocational Education, Gender Equity Tip Sheets, Project SERVE, University of Missouri).</p> <p><u>Evidence:</u> The use of this approach with schools using a technical assistance model over 7 years was highly successful (Riley, 1997).</p>
<p>Invite, involve, and educate parents</p>	<ul style="list-style-type: none"> <input type="checkbox"/> Access to and participation in math, science, and technology <input type="checkbox"/> Nontraditional role models <input type="checkbox"/> Early exposure <input type="checkbox"/> Self-efficacy <input type="checkbox"/> Student attitudes <input type="checkbox"/> Occupational choice 	<p><u>Theory and Models:</u> Parents are the first introduction a child has to a career, and they have a strong influence on student course selection and career choice.</p> <p><u>Evidence:</u> Recommendations for parents include: (1) create at-home activities that involve hands-on problem solving, such as blocks and construction toys; (2) engage in daily math routines, such as determining the appropriate tip to leave at a restaurant or determining unit prices for items at the grocery store; (3) visit museums of science, and explore the contributions mathematics has made to scientific discovery; (4) collaborate with teachers in flexible and creative ways to make sure students are challenged and energized in mathematics; (5) encourage participation in math clubs and competitions; (6) explore varied careers in mathematical fields; and (7) provide female role models (Gavin, 2000).</p>
<p>Conduct middle school programs</p>	<ul style="list-style-type: none"> <input type="checkbox"/> Career guidance materials and practices <input type="checkbox"/> Early exposure <input type="checkbox"/> Self-efficacy <input type="checkbox"/> Student attitudes 	<p><u>Theory and Models:</u> Early exposure to nontraditional careers will increase the potential for a student to pursue a nontraditional career, and decrease their own notions of sex bias and stereotyping.</p> <p><u>Evidence:</u> Overwhelmingly, the research indicates that early nontraditional experiences and exposure to nontraditional careers positively affect student potential for pursuing a nontraditional career (Markert, 1996; Education Development Center, Inc., 1996; Kloosterman, 1994; Van Buren, 1993; Kerka, 2001).</p>

Improvement Strategy	Root Causes Addressed	What the Literature Says
<p>Provide role models and mentors</p>	<ul style="list-style-type: none"> <input type="checkbox"/> Nontraditional role models <input type="checkbox"/> Self-efficacy 	<p><u>Theory and Models:</u> Students need to see others like themselves participating in a career, in order to believe they can do it, too.</p> <p><u>Evidence:</u> Nontraditional role models and mentors are overwhelmingly presented in the nontraditional training and employment literature as a common and successful strategy for recruiting and retaining students in nontraditional careers (Montclair State College, 1991; Foster & Simonds, 1995; Florida State Department of Education, 1996; National School-to-Work Opportunities Office, 1996; Markert, 1996; Clark, 2000; Gavin, 2000).</p>
<p>Conduct targeted recruitment activities</p>	<ul style="list-style-type: none"> <input type="checkbox"/> Career guidance materials and practices <input type="checkbox"/> Access to and participation in math, science, and technology 	<p><u>Theory and Models:</u> Students do not perceive they are welcome, unless specifically invited to explore and supported to overcome their own gender bias and stereotyping.</p> <p><u>Evidence:</u> Successful recruitment strategies include creating career/technical programs to reach all students, presenting career clusters in a way that shows how career pathways can align with interests, giving students multiple opportunities to explore both traditional and nontraditional careers, and helping students overcome stereotypes of appropriate jobs for their gender (Clark, 2000).</p>
<p>Conduct pre-technical training program</p>	<ul style="list-style-type: none"> <input type="checkbox"/> Career guidance materials and practices <input type="checkbox"/> Access to and participation in math, science, and technology <input type="checkbox"/> Nontraditional role models <input type="checkbox"/> Instructional strategies <input type="checkbox"/> Self-efficacy <input type="checkbox"/> Student attitudes 	<p><u>Theory and Models:</u> Pre-technical training programs can introduce students to nontraditional careers, give them hands-on learning opportunities, relieve math anxiety, develop support groups, and expose students to nontraditional role models.</p> <p><u>Evidence:</u> When compared to a control group, students attending a gender equity program had significantly higher levels of career and lifestyle self-efficacy, and indicated greater knowledge of nontraditional careers, and training opportunities. Nontraditional students perceived greater encouragement to explore nontraditional classes and had significantly higher occupational attractiveness scores (Fox Valley Technical College, 1991; Mewhorter, 1994; Read, 1991). Students who participated in another gender equity program indicated a decrease in mathematics anxiety, as measured by the MARS-e test for math anxiety (Montclair State University, 1997).</p>

Improvement Strategy	Root Causes Addressed	What the Literature Says
<p>Collaborate with community-based organizations</p>	<ul style="list-style-type: none"> <input type="checkbox"/> Nontraditional role models <input type="checkbox"/> Instructional strategies <input type="checkbox"/> Curriculum materials <input type="checkbox"/> Self-efficacy 	<p><u>Theory and Models:</u> Many community-based organizations (e.g., Girls Inc., American Association of University Women, YWCA, Girl Scouts, Take Our Daughters to Work) have nontraditional career exposure programs for young girls.</p> <p><u>Evidence:</u> Working with community-based organizations to expose students to nontraditional careers is one of the successful strategies to increasing enrollment of students in nontraditional training programs (University of Southwestern Louisiana, 1993).</p>
<p>Conduct professional development with teachers at all levels</p>	<ul style="list-style-type: none"> <input type="checkbox"/> Curriculum materials <input type="checkbox"/> Access to and participation in math, science, and technology <input type="checkbox"/> Instructional strategies <input type="checkbox"/> Student attitudes 	<p><u>Theory and Models:</u> Increase teacher awareness of gender bias and stereotyping in curriculum materials and classroom instruction that create negative effects on student course selection.</p> <p><u>Evidence:</u> Teacher behavior that perpetuates gender bias can influence student participation in courses and selection of further study in a particular career area (Graham, 2001). Recruitment strategies include: working with teachers in feeder schools, programs and courses that lead to participation in nontraditional career and technical education programs. (National School-to-Work Opportunities Office, 1996; Graham).</p>
<p>Implement and model gender-fair institutional strategies</p>	<ul style="list-style-type: none"> <input type="checkbox"/> School climate <input type="checkbox"/> Student attitudes 	<p><u>Theory and Models:</u> Schools that value nontraditional choices for their students and model gender equity in their institutional practices are more likely to have students participate in nontraditional programs.</p> <p><u>Evidence:</u> Institutional strategies include: nontraditional representatives on advisory committees, hiring of nontraditional instructors, conducting workshops on nontraditional careers with students and staff, providing grant incentives in RFP's, purchasing materials portraying nontraditional students, collecting data that link occupations and gender (National School-to-Work Opportunities Office, 1996).</p>

Table 19
Root and Indirect Causes for Nontraditional Completion (4S2 and 4P2)

Root (Direct) Causes	What the Literature Says
<p>Classroom climate</p>	<p><u>Theory</u>: Students who experience gender stereotyping, intimidating behaviors, or sexual harassment while in nontraditional career and technical education programs are less likely to complete the program.</p> <p><u>Evidence</u>: Students who are of the underrepresented gender experience stereotypes and intimidating behaviors preventing full participation (Thurtle, Hammond, & Jennings, 1998). Even with increased awareness of gender equity issues, the research suggests that boys and girls are treated differently in many classrooms (Younger, Warrington, & Williams, 1999). In a study examining the reasons why female students in an industrial technology class were not completing, female students attributed their lack of success to not finding the class relevant, being treated unfairly, and adhering to gender stereotypes. When efforts to create a gender-equitable classroom that engaged all students were implemented, the female completion and success rates improved (Ryan, 1999). In a survey of the job and training experiences of women employed in a skilled trade, 48.8% believed that sexual harassment remained a significant problem, and 80.5% had seen at least one woman receive unwanted sexual attention (Shaw, 1998).</p>
<p>Support services</p>	<p><u>Theory</u>: Students enrolled in nontraditional career and technical education programs who receive support services (i.e., tutoring, mentoring, support groups, child care, transportation) are more likely to succeed.</p> <p><u>Evidence</u>: A majority of nontraditional employment programs have similar components, and indicate greater success rates with students who access support services than in programs where these services are not provided (Montclair State University, 1997).</p>
<p>Student isolation based on gender</p>	<p><u>Theory</u>: When underrepresented-gender students participate together in the same program, they are more likely to succeed.</p> <p><u>Evidence</u>: When nontraditional participants enroll individually, they are less likely to integrate effectively into the social structure, more likely to suffer decreased performance, and more likely to drop out. Change is carried in cohorts, not in single individuals (Ingle, 2000).</p>
<p>Role models</p>	<p><u>Theory</u>: Providing access to nontraditional role models and mentors in a student’s nontraditional career field increases retention and success.</p> <p><u>Evidence</u>: Interviews with women employed in trades revealed four significant factors that influenced their career choice: a perceived innate ability, a strong sense of self, a desire for independence, and access to role models—especially family members (Greene & Stitt-Gohdes, 1997).</p>

Root (Direct) Causes	What the Literature Says
Instructional strategies	<p><u>Theory</u>: Gender-biased instructional and support strategies is one of the major factors for students dropping out of nontraditional career and technical education programs.</p> <p><u>Evidence</u>: Female students are more successful in classrooms where cooperative learning is addressed and teachers recognize a variety of learning styles and capitalize on students' strengths. Alternative assessments including integrated performance tasks, journals, portfolios, and pictorial explanations are valid ways of demonstrating understanding, and allow females to showcase their talent more effectively than they can on traditional tests (Gavin, 2000).</p>
Self-efficacy	<p><u>Theory</u>: Students with high self-efficacy are more likely to complete nontraditional programs.</p> <p><u>Evidence</u>: The higher an individual's sense of self, the more likely they are to choose a nontraditional career. (Montclair State University, 1997). A perceived innate ability, strong sense of self, and desire for independence are all influential factors in a student's choice of a nontraditional career (Greene & Stitt-Gohdes, 1997).</p>

Table 20
Causes Outside Control for Nontraditional Completion (4S2 and 4P2)

External Conditions/ Constraints	What the Literature Says
Spousal/ significant-other support	<p><u>Theory</u>: Women in nontraditional training programs are more likely to drop out if they do not have the support of their spouse and/or significant other.</p> <p><u>Evidence</u>: Spousal or significant-other support was found to be a factor that differentiated the women who remained in their nontraditional occupation for more than 2 years from the women who left within 2 years or who never entered (Shanahan, Denner, Rhoads, & Anderson, 1999).</p>

Table 21
Improvement Strategies for Nontraditional Completion (4S2 and 4P2)

Improvement Strategy	Root Causes Addressed	What the Literature Says
<p>Evaluate all school materials for gender bias and positive nontraditional images</p>	<ul style="list-style-type: none"> <input type="checkbox"/> Classroom climate <input type="checkbox"/> Instructional strategies 	<p><u>Theory and Models:</u> School publicity and curriculum materials often carry gender-bias messages that impact student career choices. Checklists and tips have been developed to increase schools’ awareness of these gendered practices (Wisconsin Model for Sex Equity in Career and Vocational Education, Gender Equity Tip Sheets, Project SERVE, University of Missouri).</p> <p><u>Evidence:</u> In an evaluation of equity programs in Louisiana programs that were successful at retaining students in nontraditional vocational education programs, the study found that these programs evaluated materials for gender bias and stereotyping.</p>
<p>Increase teacher and administrator quality and equity-capacity through professional development</p>	<ul style="list-style-type: none"> <input type="checkbox"/> Classroom climate <input type="checkbox"/> Instructional strategies 	<p><u>Theory and Models:</u> Teachers need rigorous and ongoing professional development to learn and improve instructional strategies for working with nontraditional students. Generating Expectations for Student Achievement (GESA) and The Equity Principal are research-based professional development models that have been effectively used to increase teachers’ and administrators’ knowledge of equitable teaching practices and leadership skills (Grayson & Martin, 1998).</p> <p><u>Evidence:</u> Through studies conducted in mathematics programs, teaching strategies that are effective in raising the achievement of females have been identified. These strategies include cooperative learning vs. competitive learning, and the need for teachers to recognize a variety of learning styles and capitalize on students’ strengths. Alternative assessments, including integrated performance tasks, journals, portfolios, and pictorial explanations are mentioned as valid ways of demonstrating understanding and allowing females to showcase their talents more effectively than they can on traditional tests (Gavin, 2000; Graham, 2001; Ryan, 1999).</p>
<p>Increase competence in diversity and sexual harassment prevention</p>	<ul style="list-style-type: none"> <input type="checkbox"/> Classroom climate <input type="checkbox"/> Instructional strategies 	<p><u>Theory and Models:</u> Students will not persist in an instructional environment where their contributions are not valued, they are being harassed, or they do not feel they are being treated fairly.</p> <p><u>Evidence:</u> Decreasing gender bias is identified in the literature as a common strategy for retaining female students in math and science, and nontraditional students in career and technical education programs (Markert, 1996; National School-to-Work Opportunities Office, 1996; Vocational Curriculum Resource Center of Maine, 1993; University of Southwestern Louisiana, 1993; Ryan, 1999; Clark, 2000; Graham, 2001).</p>

Improvement Strategy	Root Causes Addressed	What the Literature Says
<p>Conduct nontraditional student support groups and peer counseling</p>	<ul style="list-style-type: none"> <input type="checkbox"/> Support services <input type="checkbox"/> Student isolation based on gender <input type="checkbox"/> Instructional strategies <input type="checkbox"/> Role models <input type="checkbox"/> Self-efficacy 	<p><u>Theory and Models:</u> Students are more likely to complete programs if they feel they are supported and are part of a peer group. These strategies are also more likely to improve a student’s self-efficacy.</p> <p><u>Evidence:</u> In a group of studies of effective programs, retention strategies identified included: access to nontraditional student clubs and team support systems, and participation in math clubs, competitions, and after-school programs (Foster & Simonds, 1995; Silverman, 1999; Gavin, 2000). Students who participated in nontraditional support programs increased their self-esteem (Montclair State University, 1997).</p>
<p>Provide nontraditional role models, mentors, and job shadowing</p>	<ul style="list-style-type: none"> <input type="checkbox"/> Role models <input type="checkbox"/> Self-efficacy 	<p><u>Theory and Models:</u> Ongoing exposure to nontraditional role models and mentors, and job exposure with an individual in a nontraditional career are effective strategies for retaining students in nontraditional career and technical education programs.</p> <p><u>Evidence:</u> The research consistently indicates that role models are an effective strategy for retention (Foster & Simonds, 1995; Florida State Department of Education, 1996; Markert, 1996; National School-to-Work Opportunities Office, 1996; Clark, 2000; Gavin, 2000).</p>
<p>Invite, involve and educate parents</p>	<ul style="list-style-type: none"> <input type="checkbox"/> Role models <input type="checkbox"/> Self-efficacy 	<p><u>Theory and Models:</u> Parents are often one of the strongest influences on students pursuing nontraditional careers. Parents may allow a student to explore a nontraditional career, but may not support a student pursuing one as a permanent career choice. Involve parents who are employed in a nontraditional occupation as role models with their sons/daughters and with other students at the school.</p> <p><u>Evidence:</u> Lack of support by parents can be somewhat attributed to misinformation about a career, as well as sex bias and stereotyping that can be overcome through parent education and exposure to accurate career information. Role models, particularly family members, often contribute to an individual’s decision to pursue a nontraditional career (Greene & Stitt-Gohdes, 1997).</p>
<p>Provide a continuum of support services</p>	<ul style="list-style-type: none"> <input type="checkbox"/> Support services 	<p><u>Theory and Models:</u> Students with additional barriers beyond gender need additional support services to complete.</p> <p><u>Evidence:</u> Nontraditional training programs that work with populations with multiple barriers, and offer comprehensive support services boast higher success rates. These support services include tutoring, child care, transportation, and tuition assistance.</p>

Improving Performance on Perkins III Core Indicators

Improvement Strategy	Root Causes Addressed	What the Literature Says
<p>Invite, involve, and educate business</p>	<ul style="list-style-type: none"> ❑ Role models ❑ Instructional strategies 	<p><u>Theory and Models</u>: Businesses have a vested interest in wanting to help students develop the skills required for employment in their industry. Intel Corporation, in cooperation with Boston’s Museum of Science, and the Massachusetts Institute of Technology Media Lab, has started an after-school program—Computer Clubhouse—for female and minority students with adult mentors to learn more about computer technology (Bruner 2000). Cisco Systems, Inc., has started a gender initiative for recruiting women into the Cisco Networking Academies (Cisco Systems, Inc., 2001).</p> <p><u>Evidence</u>: Training programs that partner with corporations have dramatic benefits for low-income women. For example, The Nontraditional Employment for Women (NEW) program, which uses this strategy, places students into occupations with an average starting wage of \$12/hour (National Organization for Women Legal Defense and Education Fund, 2001).</p>

References

- American Institutes for Research (1998). *Gender Gaps: Where Schools Still Fail Our Children*. Washington, DC: American Association of University Women Educational Foundation.
- Betsworth, D. B. *Accuracy of Self-Estimated Abilities and the Relationship between Self-Estimated Abilities and Current Occupation in Women*. Paper presented at the annual meeting of the American Psychological Association, Chicago, IL, August 1997.
- Billings, S. K. (1992). *Occupational Sex-Role Stereotyping in Elementary Students*. Fort Hayes State University.
- Bougn, S. (1994). Why Do Men Choose Nursing? *Nursing and Health Care*, 15(8), 406–411.
- Brunner, R. (2000, July 24). *Minority Gains Essential to U.S. Technology Future*. *Electronic News* 46, no. 30: 10–14.
- Cisco Systems, Inc., Cisco Learning Institute. (2001). Gender Initiative. Retrieved from <http://gender.ciscolearning.org>
- Clark, P. (2000). What Do We Know about Nontraditional Careers? {and} How Can We Effectively Recruit and Teach Nontraditional Students? Columbus: The Ohio State University, College of Human Ecology.
- Davey, F. H., & Stoppard, J. M. (1993). Some Factors Affecting the Occupational Expectations of Female Adolescents. *Journal of Vocational Behavior*, 43(3), 235–250.
- DiBenedetto, V. (1999). El Paso Community College Women in Technology End-of-the-Year Report, 1998–1999. El Paso, TX: El Paso Community College.
- Education Development Center, Inc. (1996). *Exploring Work: Fun Activities for Girls*. Massachusetts: Women’s Educational Equity Act Dissemination Center.
- Education Development Center, Inc., Newton, MA: Women’s Educational Equity Act Dissemination Center (1997) School-to-Work Jump-Start Equity Kit.
- Florida State Department of Education, Tallahassee. Division of Workforce Development. (1996). Career Mentoring for Middle- and Junior-High-School Girls.
- Foster, J., & Simonds, B. (1995). *Alternative Support Systems for Nontraditional Students in Vocational Education*. Michigan State Department of Education, Lansing. Office for Sex Equity.
- Fox Valley Technical College, Appleton, WI. (1991). A Developing Aptitude Model—Sex Equity. Summary Report. Wisconsin State Board of Vocational, Technical, and Adult Education, Madison.
- Franklin, C. W., II, & Fear-Fenn, M. B. (1993). Male Issues in Vocational Education. Monograph. Volume 8, Number 2. Ohio State Department of Education, Columbus. Division of Vocational and Career Education.
- Gavin, M. K. (2000). What Parents Need To Know about . . . Encouraging Talented Girls in Mathematics. Practitioners’ Guide: National Research Center on the Gifted and Talented, Storrs, CT.

Improving Performance on Perkins III Core Indicators

- General Accounting Office, Washington, DC. National Security and International Affairs Dev. (BBB26149) (1999, September) Gender Issues. Trends in the Occupational Distribution of Military Women. Report to the Ranking Minority Member, Subcommittee on Readiness and Management Support, Committee on Armed Services, U.S. Senate.
- Gleeson, P. (1996). Women in 'Men's Work: An Issue of Identity' *Journal of Vocational Education and Training: The Vocational Aspect of Education*, 48(3), 261–276.
- Graham, M. (2001). Increasing Participation of Female Students in Physical Science Class.
- Gray, K. (1993). The Gender Gap in Yearly Earnings: Can Vocational Education Help? *Office of Special Populations Brief*, 5(2).
- Grayson, D., & Martin, M. D. (1998). *Generating Expectations for Student Achievement: An Equitable Approach to Educational Excellence*. The Equity Principal. Graymill & Associates, Inc. Retrieved from <http://www.graymill.com>
- Greene, C. K., & Stitt-Gohdes, W. L. (1997). Factors That Influence Women's Choices to Work in the Trades. *Journal of Career Development*, 23(4), 265–278.
- Hackett, G., and Betz, N. E. A Self-Efficacy Approach to the Career Development of Women. *Journal of Vocational Behavior* 18(3), 326–339.
- Ingle, Y. R. (2000). The Chosen Few: Latinas and the New Technologies. JSRI Occasional Paper No. 65. Latino Studies Series.
- Kerka, S. (2001). Nontraditional Employment and Training. Trends and Issues Alert No. 30. Office of Educational Research and Improvement (ED), Washington, DC.
- Kloosterman, D. M. (1994). A Program To Develop Awareness of Nontraditional Career Options, Gender Role Stereotyping, and Decision-Making Skills in Fifth and Sixth Grade Hispanic Girls. Nova Southeastern University.
- Markert, L. R. (1996). Gender Related to Success in Science and Technology. *Journal of Technology Studies*, 22(2), 21–29.
- Maxwell, D. J. (2000). Technology and Inequality Within the United States School Systems. *Journal of Educational Thought/Revue de la Pensee Educative*, 34(1), 43–57.
- Mewhorter, V. C. (1994). Sex Equity: Recruitment and Retention of Non-Traditional Students. Fox Valley Technical College, Appleton, WI.
- Miller, L., Wood, T. A., Halligan, J., Keller, L., Hutchinson-Pike, C., Kornbrot, D., & deLotz, J. (2000). Saying 'Welcome' Is Not Enough: Women, Information Systems and Equity in Work. *Career Development International*, 5(7), 379–389.
- Montclair State College, Upper Montclair, NJ. Life Skills Center. (1991). Demographic Profile and Needs Assessment of Single Parents and Homemakers in New Jersey Vocational Education Programs 1990-1991. New Jersey State Department of Education, Trenton. Division of Vocational Education.
- Montclair State Univ., Upper Montclair, NJ. Career Equity Assistance Center for Research and Evaluation (1997) Participants in New Beginnings and Career Equity Programs Gain Knowledge and Equitable Attitudes. Evaluation Report, Program Year 1997.
- Morgison, B. K. (1995). Occupational Sex-Role Stereotyping in Sixth Grade Students. Fort Hayes State University.

- National Organization for Women Legal Defense and Education Fund. (2001). Nontraditional Employment for Women: A Guide for Advocates. Retrieved from <http://www.nowldef.org>
- National School-to-Work Opportunities Office, Washington, DC. (1996). Non-Traditional School-to-Work Opportunities for Young Women. Resource Bulletin.
- National Women's Law Center (2002, June) Title IX and Equal Opportunity in Vocational and Technical Education: A Promise Still Owed to the Nation's Young Women.
- The Ohio State University, Columbus, Department of Home Economics Education (1996). ONOW Works! Orientation to Nontraditional Occupations for Women. A Program That Works for Women Who Want to Work.
- Read, B. (1991). Women's Career Choices: VTAE Students' Selection of Traditional and Nontraditional Programs. Chippewa Valley Technical College, Eau Claire, WI.
- Reilly, L. B. (1992). Study to Examine Math Anxiety for Students Who Are Single Parents and Those Enrolled in Nontraditional Career Preparation Programs. Montclair State College, Upper Montclair, NJ. Life Skills Center.
- Research for Action (1996). Girls in the middle: Working to succeed in School. Washington, DC: American Association of University Women Educational Foundation.
- Riley, L. L. (1997). Wisconsin Vocational Equity Leadership Cadre Support Project. Final Report. Wisconsin University. Center for Vocational, Technical and Adult Education.
- Rolling, P. C. (1996). Principals' Perceptions of Non-Traditional Gender Vocational Teachers. *Journal of Vocational and Technical Education*, 12(2), 29–39.
- Ryan, K. E. (1999). Gender Bias in Industrial Technology at the Middle School Level.
- Sadker, D. (1999). Gender Equity: Still Knocking at the Classroom Door. *Educational Leadership*, 56(7), 22–26.
- Sanders, J., Koch, J., & Urso, J. (1997). Gender Equity Right from the Start. Instructional Activities for Teacher Educators in Mathematics, Science, and Technology.
- Shanahan, E., Denner, P., Rhoads, T., & Anderson, D. (1999). Women Trained for Nontraditional Vocational Occupations: Why Do They Stay Or Leave? Paper presented at the 17th annual meeting of the Northern Rocky Mountain Educational Research Association, October 13–16, 1999, Jackson, WY.
- Shaw, L. (1998). Women in the Skilled Trades: Do They Perceive a Discriminatory Work and Training Environment?
- Sheridan, J. T. (1997). The Effects of the Determinants of Women's Movement Into and Out of Male-dominated Occupations on Occupational Sex Segregation. Wisconsin University, Madison. Center for Demography and Ecology.
- Silverman, S. (1999). Gender Equity and School-to-Career. A Guide to Strengthening the Links to Nontraditional Careers. Connecticut Women's Education and Legal Fund, Hartford.
- Stenberg, L., (1991, July) Women at Work: Following Post-Secondary Female Vocational Students in Programs Nontraditional to Their Gender.

- Stumpf, H., & Stanley, J. C. (1997). The Gender Gap in Advanced Placement Computer Science. *College Board Review*, (181), 22–27.
- Thompson, S. (1994). May the Force Be Walloped. Educators Must Overcome Stereotypes to Recruit Nontraditional Students. *Vocational Education Journal*, 69(2), 21–23.
- Thurtle, V., Hammond, S., & Jennings, P. (1998). The Experience of Students in a Gender Minority in Courses at a College of Higher and Further Education. *Journal of Vocational Education and Training: The Vocational Aspect of Education*, 50(4), 629–646.
- University of Central Florida, Orlando. College of Education. (1998). Registered Apprenticeships in Nontraditional Occupations for Florida's Women: Accessing Opportunities and Overcoming Barriers. 1998 Annual Report. Florida State Department of Education, Tallahassee. Division of Workforce Development.
- University of Southwestern Louisiana, Lafayette. (1993). Strategies for Increased Participation of Students in Programs Not Traditional for Their Gender. Louisiana State Department of Education, Baton Rouge. Office of Vocational Education.
- Van Buren, J. B. (1993). Modeling Nontraditional Career Choices: Effects of Gender and School Location Response to a Brief Videotape. *Journal of Counseling and Development*, 71(4), 101–104.
- Warrington, M., & Younger, M. (2000). The Other Side of the Gender Gap. *Gender and Education*, 12(4), 493–508.
- Yoder, J. D., & Schleicher, T. L. (1996). Undergraduates Regard Deviation from Occupational Gender Stereotypes as Costly for Women. *Sex Roles: A Journal of Research*, 34(3–4), 171–188.
- Younger, M., Warrington, M., & Williams, J. (1999). The Gender Gap and Classroom Interactions: Reality and Rhetoric? *British Journal of Sociology of Education*, 20(3), 325–341.