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
Career guidance materials and practices	Theory: Gender-biased career guidance practices can deter students from participating in nontraditional training programs. Evidence: 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).
Access to and participation in math, science, and technology	Theory: Participation and success in math, science, and technology courses are gateways for participation in nontraditional careers for women. Evidence: 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). 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).

Root (Direct) Causes	What the Literature Says
Instructional strategies	Theory: Teachers are generally unaware of subtle, and not so subtle, gender-biased instructional strategies that influence student participation and success in school. Evidence: 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).
Nontraditional role models	Theory: Nontraditional role models are a significant factor in a student's choice to pursue a nontraditional career. Evidence: 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).
Early exposure	Theory: To be effective, exposure to nontraditional careers needs to happen in elementary school. Evidence: 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).
Curriculum materials	Theory: Visual images of individuals in nontraditional careers can positively impact student participation. Evidence: 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).
Occupational choice	Theory: Exposure of women to high-skill/high-wage occupations has the potential to close the gender gap in annual and lifetime earnings. Evidence: 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).

Root (Direct) Causes	What the Literature Says
Self-efficacy	Theory: 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. Evidence: 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).
School climate	Theory: 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. Evidence: 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).
Student attitudes	Theory: Schools can impact student attitudes, biases, and stereotyping regarding their potential career aspirations. Evidence: 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).

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

External Conditions/ Constraints	What the Literature Says
Family demographic characteristics	Theory: 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. Evidence: 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).

External Conditions/ Constraints	What the Literature Says
Peer influence	Theory: Peer influence is a significant factor in affecting a student's course selection and career choice. Evidence: 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).
Media representation	Theory: Public image, media, and advertising impacts student's consideration of or participation in nontraditional careers. Evidence: The way nontraditional careers are advertised and perceived by the public has a significant impact on who pursues these opportunities (Kerka, 2001).
Wage potential	Theory: Earnings potential has a positive influence on women considering nontraditional careers, and may be a negative influence on men considering nontraditional careers. Evidence: 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).
Social attitudes	Theory: Students develop biased attitudes about nontraditional careers from a variety of sources outside the school. Evidence: 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).

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

Improvement Strategy	Root Causes Addressed	What the Literature Says
Review career guidance materials and practices for gender bias and nontraditional exposure and support	❑ Career guidance materials and practices ❑ Occupational choice ❑ Access to and participation in math, science, and technology	Theory and Models: 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). Evidence: The use of this approach with schools using a technical assistance model over 7 years was highly successful (Riley, 1997).
Invite, involve, and educate parents	❑ Access to and participation in math, science, and technology ❑ Nontraditional role models ❑ Early exposure ❑ Self-efficacy ❑ Student attitudes ❑ Occupational choice	Theory and Models: Parents are the first introduction a child has to a career, and they have a strong influence on student course selection and career choice. Evidence: 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).
Conduct middle school programs	❑ Career guidance materials and practices ❑ Early exposure ❑ Self-efficacy ❑ Student attitudes	Theory and Models: 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. Evidence: 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).

Improvement Strategy	Root Causes Addressed	What the Literature Says
Provide role models and mentors	❑ Nontraditional role models ❑ Self-efficacy	Theory and Models: Students need to see others like themselves participating in a career, in order to believe they can do it, too. Evidence: 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).
Conduct targeted recruitment activities	❑ Career guidance materials and practices ❑ Access to and participation in math, science, and technology	Theory and Models: Students do not perceive they are welcome, unless specifically invited to explore and supported to overcome their own gender bias and stereotyping. Evidence: 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).
Conduct pre-technical training program	❑ Career guidance materials and practices ❑ Access to and participation in math, science, and technology ❑ Nontraditional role models ❑ Instructional strategies ❑ Self-efficacy ❑ Student attitudes	Theory and Models: 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. Evidence: 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).

Improvement Strategy	Root Causes Addressed	What the Literature Says
Collaborate with community-based organizations	❑ Nontraditional role models ❑ Instructional strategies ❑ Curriculum materials ❑ Self-efficacy	Theory and Models: 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. Evidence: 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).
Conduct professional development with teachers at all levels	❑ Curriculum materials ❑ Access to and participation in math, science, and technology ❑ Instructional strategies ❑ Student attitudes	Theory and Models: Increase teacher awareness of gender bias and stereotyping in curriculum materials and classroom instruction that create negative effects on student course selection. Evidence: 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).
Implement and model gender-fair institutional strategies	❑ School climate ❑ Student attitudes	Theory and Models: 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. Evidence: 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).

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

Root (Direct) Causes	What the Literature Says
Classroom climate	Theory: 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. Evidence: 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).
Support services	Theory: 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. Evidence: 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).
Student isolation based on gender	Theory: When underrepresented-gender students participate together in the same program, they are more likely to succeed. Evidence: 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).
Role models	Theory: Providing access to nontraditional role models and mentors in a student's nontraditional career field increases retention and success. Evidence: 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).

Root (Direct) Causes	What the Literature Says
Instructional strategies	Theory: Gender-biased instructional and support strategies is one of the major factors for students dropping out of nontraditional career and technical education programs. Evidence: 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).
Self-efficacy	Theory: Students with high self-efficacy are more likely to complete nontraditional programs. Evidence: 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).

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

External Conditions/ Constraints	What the Literature Says
Spousal/ significant-other support	Theory: 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. Evidence: 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).

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

Improvement Strategy	Root Causes Addressed	What the Literature Says
Evaluate all school materials for gender bias and positive nontraditional images	❑ Classroom climate ❑ Instructional strategies	Theory and Models: 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). Evidence: 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.
Increase teacher and administrator quality and equity-capacity through professional development	❑ Classroom climate ❑ Instructional strategies	Theory and Models: 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). Evidence: 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).
Increase competence in diversity and sexual harassment prevention	❑ Classroom climate ❑ Instructional strategies	Theory and Models: 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. Evidence: 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).

Improvement Strategy	Root Causes Addressed	What the Literature Says
Conduct nontraditional student support groups and peer counseling	❑ Support services ❑ Student isolation based on gender ❑ Instructional strategies ❑ Role models ❑ Self-efficacy	Theory and Models: 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. Evidence: 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).
Provide nontraditional role models, mentors, and job shadowing	❑ Role models ❑ Self-efficacy	Theory and Models: 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. Evidence: 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).
Invite, involve and educate parents	❑ Role models ❑ Self-efficacy	Theory and Models: 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. Evidence: 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).
Provide a continuum of support services	❑ Support services	Theory and Models: Students with additional barriers beyond gender need additional support services to complete. Evidence: 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.

Improvement Strategy	Root Causes Addressed	What the Literature Says
Invite, involve, and educate business	❑ Role models ❑ Instructional strategies	Theory and Models: 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). Evidence: 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).

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