

ACTION RESEARCH BRIEF

Strategies to increase the concentration of students in nontraditional occupations (NTO)



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Abstract

Nontraditional occupations (NTO) are jobs in which 25% or less of the workforce is either male or female and this particular gender is considered a minority in the field. The gender divide in these occupations weakens the economy by decreasing economic productivity and reducing the diversity in decision making. In addition, the gender divide in high-paying occupations can trap individuals, especially single mothers, in poverty. Given the importance of gender parity across occupations, a key goal of Perkins V (Strengthening Career and Technical Education for the 21st Century Act) is increasing the concentration of students in nontraditional occupations based upon their gender (3P1 - NTO Concentration). NTO concentration rates have been a challenge across the Wisconsin Technical College System (WTCS) and have remained flat with no evidence of increasing over time. Thus, this action research brief explores areas of strength and opportunity for NTO across WTCS and provides an analysis of and resources for best practices to improve NTO success. Key strategies that improve NTO outcomes include creating NTO student support networks, having designated NTO staff to support NTO projects and students across the district, leveraging NTO role models, and providing outreach to middle and high schools for NTO careers and opportunities.

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This research brief is based on the Perkins Nontraditional Occupation (NTO) Concentration metric and definition, which simplifies gender to binary male and female categories. As part of its broad commitment to diversity, equity and inclusion, WTCS is specifically committed to recognizing, including and supporting the success of students, faculty, staff, and college leaders of all gender identities.

Introduction

Many occupations are assigned traditional gender roles: nurses are predominantly women and welders are predominantly men, for instance. In fact, of the more than 2,000 Classification of Instructional Program (CIP) codes, approximately 74% of these are designated as occupational program areas with a traditional gender role.¹ These program areas are defined as ‘nontraditional occupations’ (NTO) in which based on national labor market data, either men or women are considered a minority group within the workforce and less than 25% of workers in the occupation are either male or female.

Increasing gender diversity across occupations leads to better economic productivity and helps to build strong communities. Companies with greater employee gender diversity are more productive in terms of revenue and market value, and diverse teams develop more creative ideas and solutions.² Creating gender parity in which “women participate in the labor force at the same rate as men, work the same number of hours as men, and are employed at the same levels as men across sectors”, would lead to a \$4.3 trillion increase in the United States GDP in 2025.³

Gender diversity in occupations would also help reduce poverty, thereby building stronger and more resilient communities. Many occupations that have been traditionally considered ‘female’ make lower wages.^{4,5} In Wisconsin, over 136,000 households are headed by single mothers. Of these, 70% of single mother households are struggling to make ends meet (i.e., below the Asset Limited Income Constrained, Employed threshold) and 38% are living below the federal poverty line.⁶ Nationwide, of the households living in poverty, 60% of these are headed by single mothers³ and in general, women are more likely to live in poverty than men regardless of household type.⁷ Creating gender parity in workforce composition for traditionally high-paying male-gendered careers would help decrease female poverty rates and break the cycle of poverty for individuals raised in single mother led households.⁷

Occupational identity research has shown that individuals are often funneled into career choices through a lifetime of signals (e.g., stereotypes, expectations and assumptions) from their family, community, educational context and popular media.^{5,8} These signals often reinforce gender stereotypes for occupations and shape an individual’s expectations of their capabilities (e.g., self-efficacy in math is much lower for girls than boys even though there is no difference in math abilities or performance).⁹ Yet, interventions and programs that increase exposure to different careers and representation within these careers can change these dynamics.⁸

Addressing these barriers and creating better gender-parity in our workforce is a key goal in the Strengthening Career and Technical Education for the 21st Century Act, also called Perkins V. In Perkins V, a federal indicator that evaluates the progress of postsecondary career and technical education (CTE) programs is ‘NTO Concentration’ (3P1). NTO concentration is the percent of students who are concentrating in a CTE program (e.g., have successfully completed 12 or more credits in the program) that is nontraditional based upon the identified gender of the student (e.g., female students in law enforcement programs, male students in early childhood education programs) compared to all students who are concentrating in these NTO-labeled programs (e.g., programs that lead to careers in which men or women are considered a minority). For more information, please see the [WTCS Perkins Accountability Guide](#).

In Wisconsin, the Perkins V NTO Concentration indicator has hovered around 17% (e.g., 17% of students are concentrating in programs that are nontraditional for their gender) since 2013 with no evidence of increasing (Figure 1). Thus, the goal of this action research project is to explore WTCS data and national research to identify evidence-based practices that colleges can implement and scale in their NTO work and grant activities to help improve the Perkins 3P1-NTO Concentration indicator. To do this, we conducted an analysis of WTCS NTO Concentration data to identify areas of strength and opportunity, identify colleges that have experienced NTO success, and create a Scale of Adoption Assessment for NTO Programs based on research-supported practices.

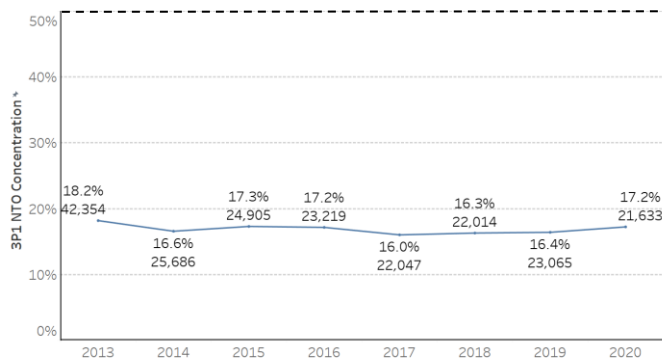


Figure 1. Change in 3P1 NTO concentration from the WTCS Perkins 2013 cohort to the Perkins 2020 Cohort. The goal of NTO concentration is to reach gender parity with 50% NTO concentration (dotted line). WTCS NTO concentration levels have remained around 16-17% for the past eight Perkins cohorts

Methods

We evaluated NTO concentration data based on the 2020 NTO program crosswalk from [Department of Education](#) (released in October 2020). This crosswalk determines which career and technical education programs are considered to have a gender bias using national workforce data. Where applicable, we also show how trends in NTO concentration vary or are maintained in the 2020 NTO program crosswalk compared with the previous [NTO program crosswalk](#) (released in 2013).

Results and Discussion

Within WTCS data for NTO concentration, several areas of strength and opportunity emerge. Across career clusters, NTO concentration varies widely from 7.5% to 53.3% (Figure 2). Programs within Hospitality and Tourism and Business, Management and Administration have reached or are approaching gender parity. In particular, the Business Management program (10-102-3), which was added as an NTO-labeled program in the 2020 NTO program crosswalk, has large enrollments (2,000 Perkins concentrators per cohort) and about half of these enrollments are female students. Nationally, women are considered a minority in this occupation. Due to the strong NTO outcomes in Business Management, WTCS NTO concentration levels increased from 14% with the 2013 NTO program crosswalk to 17% with the 2020 crosswalk. Health Science programs provide an area of opportunity for increasing NTO concentration since these programs have the largest number of students (8,692 in the 2020 cohort), yet the NTO concentration is below the overall WTCS level at 11.2%.

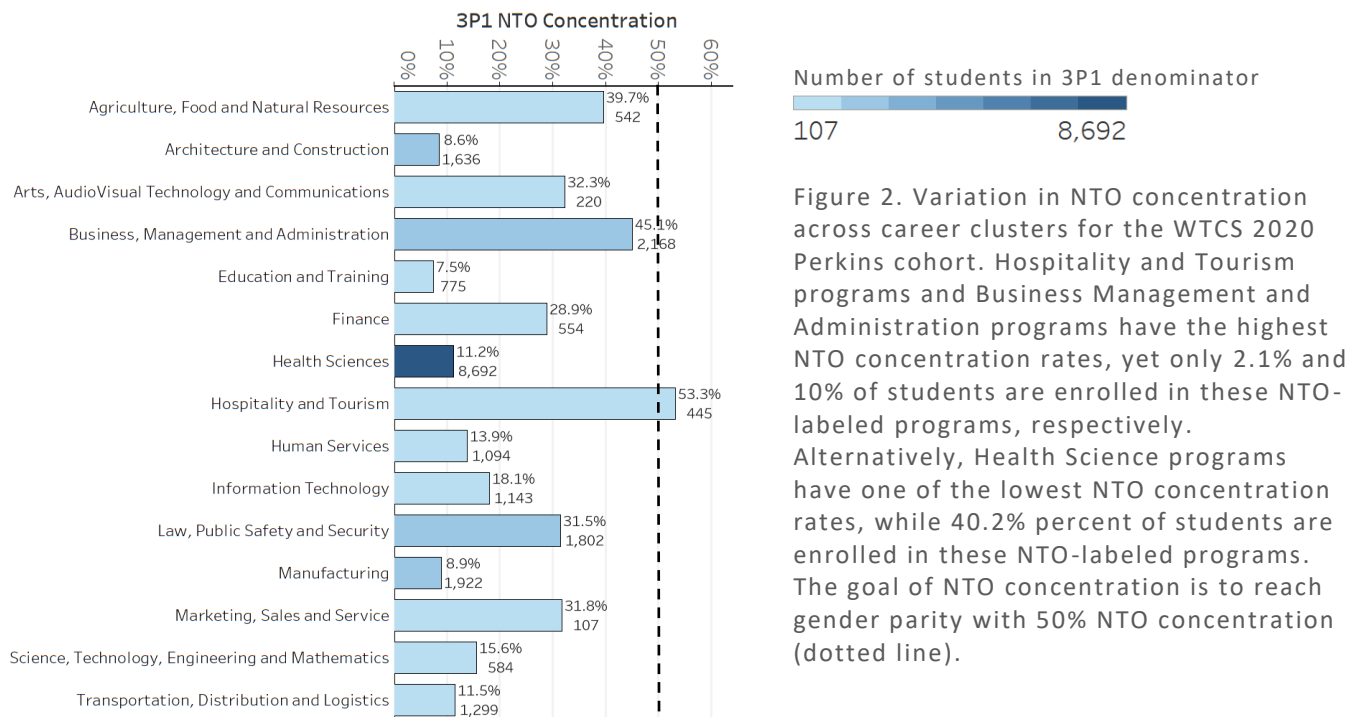


Figure 2. Variation in NTO concentration across career clusters for the WTCS 2020 Perkins cohort. Hospitality and Tourism programs and Business Management and Administration programs have the highest NTO concentration rates, yet only 2.1% and 10% of students are enrolled in these NTO-labeled programs, respectively. Alternatively, Health Science programs have one of the lowest NTO concentration rates, while 40.2% percent of students are enrolled in these NTO-labeled programs. The goal of NTO concentration is to reach gender parity with 50% NTO concentration (dotted line).

NTO Concentration areas of strength:

- Agriculture, Food and Natural Resources
- Arts, Audiovisual Technology and Communications
- Business, Management and Administration
- Finance
- Hospitality and Tourism
- Law, Public Safety and Security
- Marketing, Sales and Service

NTO Concentration areas of opportunity:

- Architecture and Construction
- Education and Training
- Health Sciences
- Human Services
- Manufacturing
- Transportation, Distribution and Logistics

Across student groups, NTO concentration varies from 8.9% to 40.0% (Figure 3), and all student groups exhibit NTO concentration rates that are significantly lower than gender parity levels (i.e., 50%). Within these patterns, students of color generally have slightly higher NTO concentration levels than white students. In addition, female students have higher NTO concentration levels than male students. Dual enrollment high school students exhibit the lowest NTO concentration levels at approximately 8.9%.

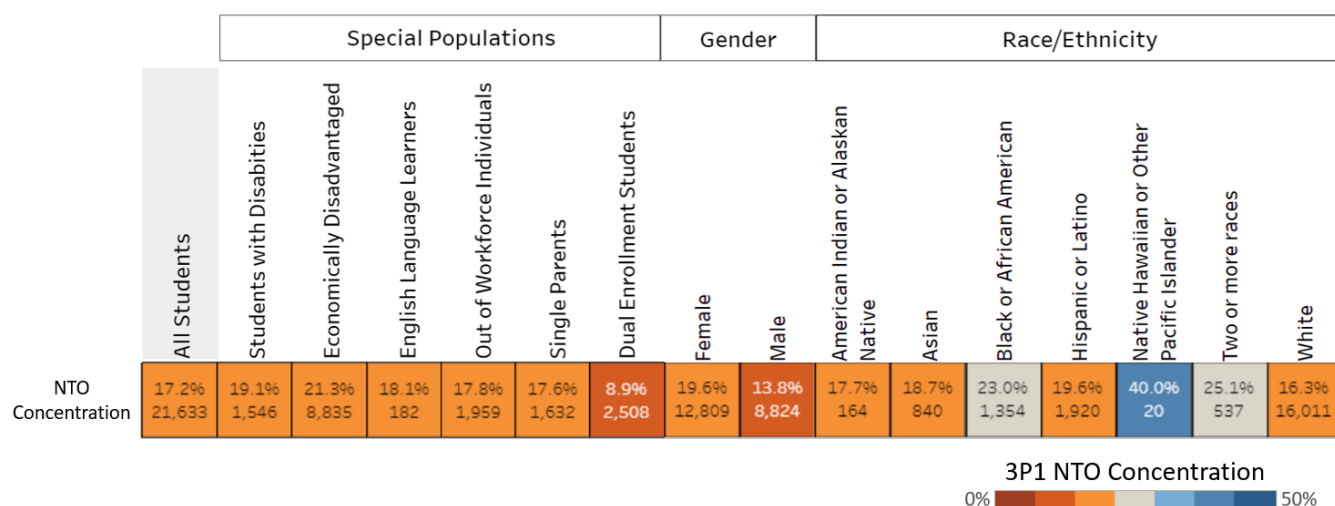


Figure 3. Comparison of NTO Concentration across student groups, including all Perkins students in an NTO-labeled program, Perkins special populations, gender, race and ethnicity, and dual enrollment students for the 2020 WTCS Perkins cohort. Within each square, the top number is the 3P1 NTO concentration rate and the bottom number is the number of students in the 3P1 denominator.

Across colleges and program areas, a few trends emerged in which NTO concentration levels have increased since the 2013 Perkins cohort. These areas of NTO growth, include:

- Gateway Technical College's (GTC) Manufacturing programs, increasing from 11% to 28% from 2017 to 2019,
- Milwaukee Area Technical College's (MATC) programs in:
 - STEM, doubling from 12% to 24% from 2013 to 2019,
 - Law, Public Safety and Security, increasing from 27 to 45% from 2013 to 2019,
 - Architecture and Construction, increasing from 8% to 18% from 2017 to 2019,
- Chippewa Valley Technical College's (CVTC) college wide NTO concentration increase from 11% to 15% from 2013 to 2019, with noticeable increases in programs in:
 - Architecture and Construction, increasing from 1% to 6% from 2013 to 2019,
 - Business Management and Administration, increasing from 5% to 18% from 2016 to 2018,
 - Manufacturing, increasing from 3% to 11% from 2014 to 2019.

To better understand and identify promising practices at these colleges that could be contributing to NTO growth, we conducted interviews with their Perkins and program area teams (Table 1). Within these interviews, several common themes emerged, while each college also had unique NTO strategies that help support NTO growth, summarized below.

Table 1. Summary of the college team members that play a role in NTO concentration for GTC, MATC and CVTC.

Gateway Technical College

Position Title	Role in NTO work
Director, Student Support & Tutoring Services	NTO Perkins Grant Manager, Oversees tutoring administration
Dean, School of Manufacturing, Engineering and IT	Oversees NTO program areas that have exhibited NTO growth
Director, High School Partnerships	Promotes NTO in dual enrollment
Grant Administrators	Write and monitor Gateway Perkins Grants
Student Support Specialist	NTO point-person and coordinator

Milwaukee Area Technical College

Position Title	Role in NTO work
Director, Quality Planning & Assessment	Oversees grants and resource development team
Manager, Career Experience & Transfer	NTO point-person and coordinator
Coordinator, Perkins Grant Projects	Coordinator of Perkins grant projects
Coordinators, Grants & Development	Coordinator of grant writing

Chippewa Valley Technical College

Position Title	Role in NTO work
VP, Student Services	Oversees student services work at college
Director, Advisement and Services	Perkins Plan Coordinator
Director, PK-12 Initiatives	Promotes NTO in dual enrollment
Diversity Manager	NTO coordinator
Student Success Specialist	Supports NTO students
Student Success Specialist	Strengthening CTE Programs Perkins Grant Coordinator

Designated NTO Staff

Each college has a designated NTO point of contact who helps to support NTO students and is also widely known across the college as a resource for NTO guidance. This NTO coordinator connects with faculty, program leadership, dual enrollment managers, student services staff and employer partners.

Outreach to Middle and High School Students

Each college also invests in outreach to middle and high school students for NTO programs. Outreach to middle school students is critical for early exposure to NTO careers and role models. Research has shown that waiting

until high school may be too late for students who start to self-identify their perceived skill level (e.g., whether they are adept at math and science) and potential career options (e.g., occupational identity).^{8,10} Outreach to middle school students also allows the opportunity to connect with the students' parents early on which can be crucial for developing occupational identity in a nontraditional career.⁸ An example of middle school outreach includes GTC's Women in Manufacturing event which is sponsored by local employers. At this event, successful women in manufacturing share their stories with the students, which helps to expose young students to this career path and counteracts traditional gender stereotypes.

Outreach to high school students can help expose students to NTO career pathways and improve the transfer experience for dual enrollment students as they move to college. For example, CVTC has expanded dual enrollment from three academies in 2017 to 74 academies in 2020-21. These academies are primarily focused in NTO areas (e.g., manufacturing, IT, healthcare, etc.) and provide excellent wraparound student supports that help students transition to CVTC. In addition, CVTC staff work with high school counselors to provide information on high-demand jobs in the area, career pathways and the importance of nontraditional occupations. This connection with high school counselors can help broaden the career guidance that is then given to high school students. MATC outreach to high school students uses strategic branding to reach more NTO students (e.g., 'Makers Camp' rather than 'Sheet Metal Camp').

Supportive NTO Role Models

Each college also provides supportive NTO role models for students. These role models include fellow students (e.g., NTO students who are further along in the program mentor incoming students), alumni who return for networking and NTO student success events, NTO faculty, and NTO dean and leadership support. For example, MATC has NTO networking events that NTO students, faculty, alumni, deans and the President attend. These events not only highlight women in NTO leadership roles ([MATC STEM](#) and [MATC Manufacturing](#) deans are both women) but also shows strong college leadership support of NTO programming and a focus on NTO success. Gateway's CNC Program benefits from faculty who go above and beyond. A Gateway CNC Program instructor provides a role model for female students in manufacturing and is a committed recruiter, going door to door on weekends to meet with families and promote NTO opportunities in manufacturing.

GTC Manufacturing Programming for Incarcerated Women

A unique NTO success strategy at GTC is providing an NTO manufacturing program at the Robert Ellsworth Correctional Facility, a minimum-security facility for incarcerated women. In this CNC program, the students are provided with comprehensive wraparound supports. Soft skills are embedded into the curriculum, including creating resumes and cover letters, study skills, Clifton Strengths Finder, time management, vision boards, mock interviews, and guest speakers. In addition, students receive services including IT support, disability services, tutoring, support counseling, transition services, and employment services. So far, five cohorts of students have enrolled in this program with typically 10-11 students per cohort, and both graduation rates (>80%) and employment rates (>65% across all cohorts, varying from 44% to 91%) have been consistently high.

MATC Student Supports and Program Review

Unique NTO success strategies at MATC, include student support networks and an NTO committee for program review and improvement. NTO students have been provided with a Maker Space to connect with each other on campus. In addition, the NTO coordinator has an office near this space to help connect with and get to know the NTO students. The college has a [Women in Technology](#) group that provides networking, support for students, and professional learning (e.g., hearing from NTO alumni).¹¹ This strong student NTO network helps NTO students feel that they belong at the college and in their nontraditional programs.

Establishing an intentional NTO program review process also likely contributed to increasing NTO concentration metrics at MATC. The NTO steering committee reviewed NTO programs and made recommendations for improvements. The committee consisted of a cross-functional team, including Associate Deans from the NTO

career areas, directors of the quality review process (QRP), recruiters, [instructor role models](#), and the NTO coordinator.¹² The group reviewed equity resources from the National Alliance for Partnerships in Equity (NAPE), which then informed their recommendations for program-specific activities to improve NTO concentration levels. This work also helped to increase NTO [awareness](#) and access to NTO resources across the college.¹³

CVTC Case Management and Gatekeeper Course Evaluation

Unique NTO success strategies at CVTC include comprehensive case management and regularly evaluating and supporting Perkins cohort student performance in gatekeeper courses. CVTC uses the ADVISE student services database for case management. Within ADVISE, NTO students are identified so that student success specialists know who to reach out to and how to best support these students. The ADVISE system also provides early alerts to staff about any challenges that students may need help with overcoming (e.g., not enrolling in the next semester, low grade warnings, financial aid holds, active alerts from faculty). For NTO case management, there is a consistent routing in which all NTO student information is directed to an NTO student support specialist.

In addition to general NTO student case management, CVTC closely tracks Perkins students' performance in gatekeeper courses. In this analysis, they identify students who need more assistance in their general education gatekeeper courses (e.g., math, communications, social sciences). Instructors of these gatekeeper courses are provided with a list of their Perkins cohort students for each course section. Throughout the course, student support specialists and instructors reach out to these students on a regular basis to help them succeed in the course. Since this cohort support practice was implemented in 2013, CVTC has not missed any Perkins indicator targets. CVTC leverages the [Perkins Strengthening CTE Programs grant](#) to support this work.

Implications

While increasing Perkins NTO metrics has been a challenge for WTCS, we can readily identify key practices at specific colleges that are increasing NTO concentration. In addition, there are several WTCS resources that can be leveraged to help develop and scale these practices across each college. These resources include a newly developed Scale of Adoption Assessment for NTO Programs, Perkins grants, and the WTCS NTO community of practice.

The [Scale of Adoption Assessment for NTO Programs](#) is based upon best practices highlighted in a literature review of NTO research that was conducted by the National Alliance for Partnerships in Equity.¹⁰ These practices include college-level NTO supports (e.g., designated staff to support NTO work), program-level supports (e.g., comprehensive NTO support networks for students), and NTO practices in the classroom (e.g., inclusive instructional materials). Within the assessment, staff from each NTO program can evaluate these recommended practices to determine the scale at which these practices are currently in place, what work has already been conducted for each practice, and can set next steps and a timeline for scaling this practice. In addition, many of these recommended NTO practices can be supported by WTCS Perkins V grants. Below is a list of the available Perkins V grants with information about which recommended NTO practices each grant could help support.

Capacity Building for Equity and Inclusion

- Professional development for building inclusive learning materials, incorporating inclusive teaching practices, encouraging growth mindsets, understanding and responding to implicit biases and microaggressions
- Implement Universal Design for Learning (UDL) in NTO programs
- Update NTO content across the college (e.g., course content, student resources, marketing information, open educational resources, etc.) to be more inclusive of diverse perspectives and identities
- Building data dashboards for instructors that disaggregate data at the course-level (e.g., assessments)
- Conduct NTO focus groups, interviews and student surveys to assess course and program climate for NTO students

- Improve recruitment and retention practices to hire more NTO faculty members

Promoting and Supporting High School to College Transitions & Career Prep Purpose

- Developing NTO high school academies
- High school recruitment and awareness activities for NTO fields (e.g., NTO career fairs)

Student Success

- Holistic NTO student supports (e.g., advising, tutoring, financial literacy, etc.)
- Career guidance and coaching for NTO students
- Monitoring NTO student progress with comprehensive case management
- Professional development for building inclusive learning materials, incorporating inclusive teaching practices, encouraging growth mindsets, understanding and responding to implicit biases and microaggressions
- Implement Universal Design for Learning (UDL) in NTO programs
- Creating NTO student organizations and networks

Supporting Access and Completion of NTO Training and Employment

- Holistic NTO student supports (dependent care and transportation assistance)
- Middle and high school recruitment and awareness activities for NTO fields (e.g., NTO career fairs, summer camps in NTO fields)
- Creating and using inclusive instructional materials (e.g., with OER) in NTO programs
- Providing faculty and/or staff professional training for helping NTO students succeed (belonging, inclusion, etc.)
- Career guidance and coaching for NTO students
- Creating NTO student networks (mentoring, networking events, etc.)
- Monitoring NTO student progress with comprehensive case management

Strengthening CTE Programs

- Creating and using inclusive instructional materials (e.g., with OER) in NTO programs
- Tutoring supports for NTO students
- Providing faculty and/or staff professional training for helping NTO students succeed (belonging, inclusion, etc.)
- Monitoring NTO student progress with comprehensive case management

In addition, the WTCS Perkins grant manager for Supporting Access and Completion of NTO Training and Employment leads a community of practice for increasing NTO success. This group meets regularly to share practices that improve NTO outcomes across the WTCS. This NTO group includes staff who work with NTO students including associate directors for diversity and inclusion, directors of advising and student services, managers of career services, transfer and advisors, and Perkins grant writers. These NTO staff provide leadership support for college efforts to scale practices that will improve NTO concentration rates.

Scaling best practices for increasing the concentration of students in non-traditional fields based on their gender, will not only improve Perkins performance measurements but more importantly help create gender parity in the Wisconsin workforce and better economic opportunities for WTCS students. Program areas of opportunity for expanding NTO concentration include Architecture and Construction, Education and Training, Health Sciences, Human Services, Manufacturing, and Transportation, Distribution and Logistics. In addition, broader gender parity and NTO outreach is needed for all student demographics. Colleges that adopt best

practices for NTO programming, expand their use of new NTO resources (e.g., scale of adoption assessment) and leverage Perkins grant funding should see increased NTO student success and greater gender equity.

Guiding questions

- What strategies does your college/program use to help support NTO students? What additional strategies may be needed?
- At your college, which student groups and career clusters exhibit higher or lower NTO concentration rates? What factors could be underlying these patterns?
- Within NTO career pathways, are there gatekeeper courses that may lead to NTO students dropping out of the program? If so, what supports could be provided to help NTO students succeed and continue in their pathway?
- What recruitment strategies does your college/program use to attract NTO students? Do these strategies include young (elementary/middle school) students? Which populations of prospective students are and are not being reached by these approaches?
- How does your college engage NTO students to better incorporate their feedback for program and course improvements?

Resources for more information

- Use the [Scale of Adoption Assessment for NTO Programs](#) to assess best practices for increasing NTO concentration and use the [Guided Pathways Scale of Adoption Assessment](#) to assess key practices that help improve overall student success.
- Visit the [National Association for Partners in Equity \(NAPE\) website](#) for resources to help improve NTO metrics and also student equity and inclusion more generally.
- See the report '[Influences on Occupational Identity in Adolescence: A Review of Research and Programs](#)' from the Connected Learning Alliance for more information on the factors that shape occupational identity, and programs that can help overcome these barriers to increase the concentration of students in nontraditional occupations.
- For resources to support single mothers, see the Aspen Institute's '[Two Generations, One Future](#)' and '[Low-Income Single Mothers at Community College: Recommendations for Practices to Improve Completion](#)'.
- For NTO national and international associations by career cluster, visit:
 - [Women in Manufacturing](#)
 - [Women in Construction USA](#), [National Association of Women in Construction](#)
 - [WTS International](#) (Women's Transportation Seminar): Advancing Women in Transportation
 - [Advancing Men in Nursing](#)
 - *Note, that there are many online social media groups for NTO (e.g., [Black Men in Social Work](#))*

Acknowledgments

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