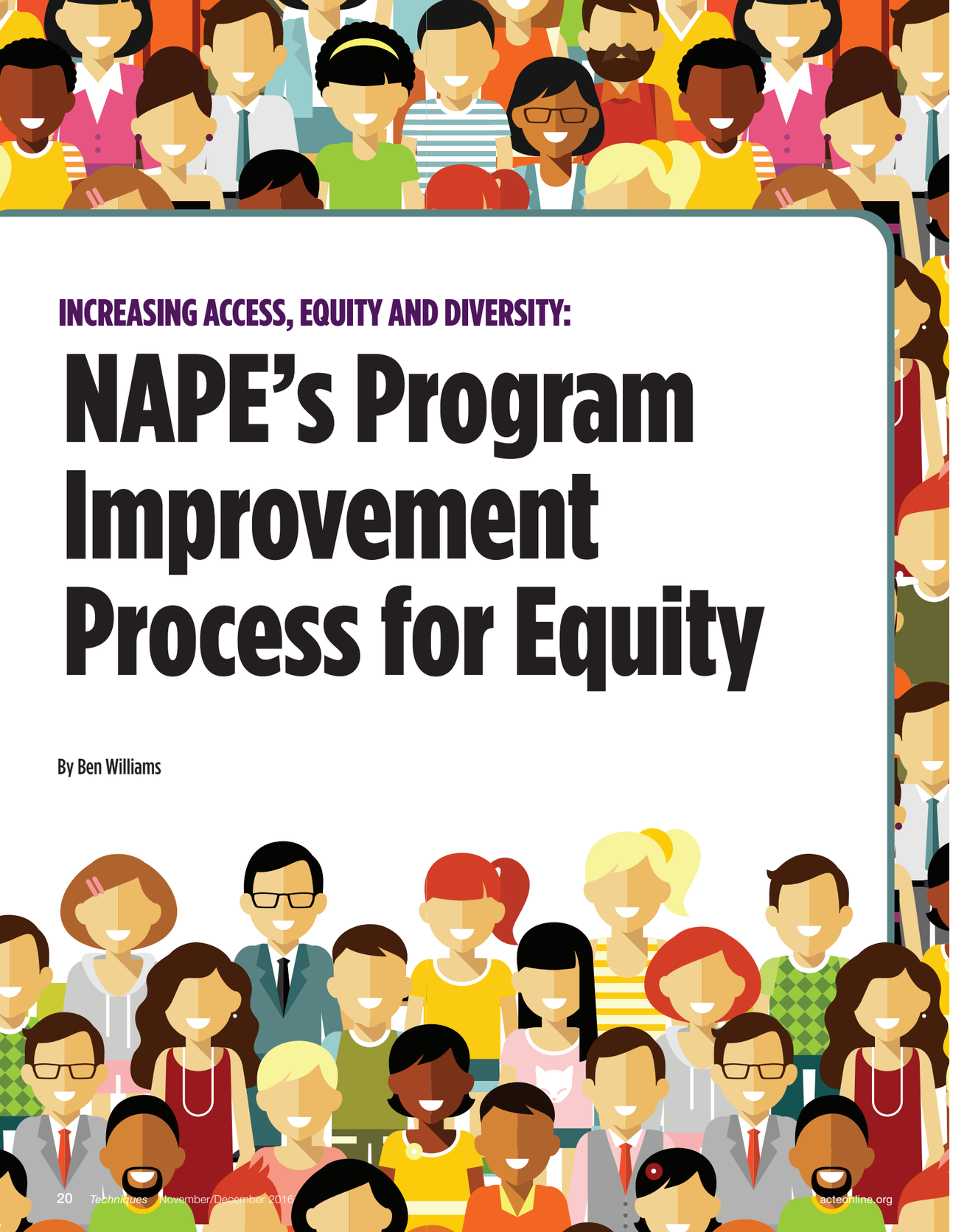


INCREASING ACCESS, EQUITY AND DIVERSITY:

NAPE's Program Improvement Process for Equity

By Ben Williams

The demand for a skilled and educated STEM (science, technology, engineering and math) workforce continues to increase. Over the next five years companies will need to replace 945,000 U.S. workers who have basic STEM literacy and 635,000 U.S. workers who have advanced STEM knowledge (Business Roundtable & Change the Equation, 2014). Yet, the participation of women, people of color and individuals from "special populations" (i.e., individuals with disabilities; individuals considered to be economically disadvantaged; individuals with limited English proficiency, including English language learners; single parents; displaced homemakers; and individuals pursuing programs that lead to nontraditional occupations) has stagnated in some cases and dropped in others. For example, from 2001 to 2014, the participation of women in engineering, computing and advanced manufacturing remained flat, and the participation of African-Americans and Latinos in those fields relative to the U.S. working-age population declined (Change the Equation, 2015).

The U.S. Department of Education's Office for Civil Rights (OCR) and the Office of Career, Technical, and Adult Education (OCTAE) released a "Dear Colleague" letter on June 15, 2016, to provide "significant guidance" in addressing the critical need for state and local education agencies (SEAs and LEAs) to increase gender equity in career and technical education (CTE).

> The letter states the following: Ensuring equitable access to CTE by eliminating discriminatory practices and taking proactive steps to expand participation of students in fields where one sex is underrepresented can increase overall participation and success in high-growth fields, such as nursing, advanced manufacturing, information technology, computer science and cybersecurity, for both men and women. … (U.S. Dept. of Education, 2016)

The Carl D. Perkins Career and Technical Education Act of 2006 (Perkins) requires every SEA to set negotiated performance measures and annually report its progress to OCTAE. If a state does not meet at least 90 percent of its negotiated target, it is required to develop and implement an improvement plan outlining the action it will take to improve its performance.

[**FIGURE 1:** PIPE training includes five modules: Organize, Explore, Discover, Select, and Act.]

Included in the Perkins accountability system are two measures directed toward gender equity in CTE. Those measures are focused on increasing the participation and completion rates of underrepresented gender students in programs that lead to nontraditional occupations, i.e., those with less than 25 percent of one gender represented in the workforce, such as women in engineering technology and men in nursing. These accountability provisions also apply to every LEA receiving Perkins funds.

NAPE's Solution: The Program Improvement Process for Equity™ (PIPE™)

The National Alliance for Partnerships in Equity (NAPE)[1] Education Foundation has designed a highly effective process to translate current research on gender equity in CTE into practice and transfer this knowledge to and through state offices of education, especially those responsible for the implementation of Perkins.

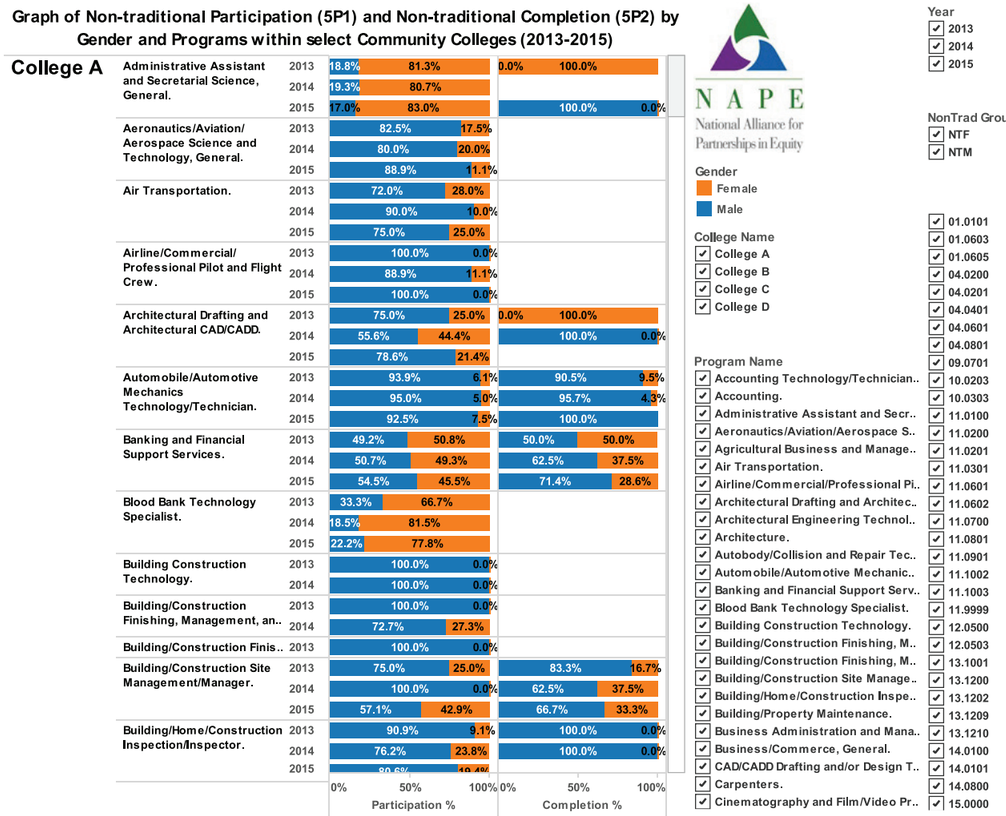
PIPE is a research-based institutional change model and professional development program designed to increase the participation and success of underrepresented students in nontraditional CTE programs, including girls and women in STEM (Williams, 2014). PIPE training includes five modules: Organize, Explore, Discover, Select and Act.

Module 1: Organize

PIPE is most effective when a cross-functional team representing the CTE and STEM education and workforce pipeline in the local community is assembled. Team members typically include administrator(s), teachers and staff members (including counselors and advisors) from local high schools and/or career centers, community colleges and middle schools, as well as community partners and employers. Also part of each Pipeline team is a site team leader from NAPE who orients and prepares the team for training.

Module 2: Explore

The data typically provided to Perkins coordinators relative to their institution's performance on the Perkins accountability measures are aggregated at the institutional level. For example, an institution's



[**FIGURE 2:** Sample data dashboard created by NAPE]

nontraditional participation might be 18 percent, but what does that mean? In some cases, those data may be disaggregated by gender, race and ethnicity, and special populations; however, one cannot identify specific programs in which there are greater equity gaps than others, especially in high-skill, high-wage and high-demand career pathways. Although the overall institutional performance may be 18 percent in this example, the participation of women in nontraditional STEM pathways, especially engineering technology or advanced manufacturing, for example, may be closer to 10 percent or even less. In order to have a clear and accurate picture of equity gaps, an institution must have program-level data as opposed to only institution-level data.

Pipeline teams provide enrollment and completion data disaggregated for the past three to five years by institution, by program and by student demographics (total, gender, race and ethnicity, and each of the special populations groups—typically economically disadvantaged students, students with disabilities and English language learners) to NAPE, which then inputs those data into data dashboards (Figure 2) to easily identify equity gaps by gender, race/ethnicity, special populations and the intersection of those categories.

Data dashboards make CTE data "meaningful, accessible and actionable" (Lufkin & Sudharsan, 2013). A data dashboard, which comes from business analytics and business intelligence, is a visualization tool that presents information in an easy-to-read format. Visualizations fit on a single screen and provide interactivity such as filtering and drill downs.

Within a data dashboard, a team can filter its data by year or by category, such as programs that are nontraditional for females. Within those filters, a team can prioritize those programs that fall within certain CTE career clusters, such as manufacturing or STEM. The team then looks at specific equity gaps by gender, race/ethnicity, special populations and their intersection. The results of this analysis become the baseline data for program improvement.

Module 3: Discover

Pipeline teams use multiple methods to identify, evaluate and select critical root causes as the focus of improvement efforts. An invaluable resource for this and the next module is *Nontraditional Career Preparation: Root Causes and Strategies* (Lufkin, Reha & Harrison, 2009), which is a distillation of the past 20 years of research literature on nontraditional career preparation, especially on women's access to STEM careers (NAPE, 2014).

Root causes fall within five categories:

- education (educational environment)
- career information
- family (perceptions)
- societal issues
- internal/individual factors

After teams have identified the key root causes they believe to be the biggest barriers to students entering into nontraditional programs, they conduct action research using a combination of surveys, interviews, focus groups and equity environmental scans.

Module 4: Select

Pipeline teams review and evaluate evidence- and research-based solutions and the empirical evidence of their effectiveness in mitigating the root causes identified in the steps outlined above, arriving at consensus around two to three specific strategies to implement.

Module 5: Act

Pipeline teams develop formative (process) and summative (outcome) measures to evaluate the effectiveness of the strategies they have agreed to employ. Creating thorough and complete short- and long-term evaluation measures and methods is a critical step in the process to ensure success.

PIPE Plan

Throughout training and implementation, the Pipeline team captures its insights and action steps in a PIPE Plan, which easily translates into an improvement plan for SEAs/LEAs that have fallen below the 90 percent threshold for nontraditional participation/completion.

PIPE's Delivery

PIPE is delivered in a combination of in-person and virtual professional development and technical assistance, which is facilitated by a NAPE-certified equity instructor over the course of an academic year. Typical implementation entails two to three days of in-person professional development and four to six one-hour technical assistance calls with site team leads. This leads to an in-person showcase where Pipeline team members share the results of their PIPE implementation and their plans for the future with other teams when implementation is done as a cohort, or with district administrators and others who have supported the project, but who have not been directly involved with the training, when training involves only one institution.

Promising Outcomes

PIPE has been the cornerstone of the National Science Foundation-funded STEM Equity Pipeline Project over the past 10 years, through which teams from 19 states received training and guidance in implementation. In addition, other SEAs and LEAs have utilized Perkins funds and other resources to support PIPE training and implementation.

One of the most exciting outcomes from this past year illustrates the effectiveness of PIPE in increasing the enrollment of underrepresented gender students, especially girls, in high-skill, high-wage and high-demand nontraditional STEM career pathways.

Recruiting Girls Into Welding

Demand for skilled welders is increasing nationwide, yet only 4.8 percent of welders in 2014 were women (NAPE, 2015). When Roseburg High School in Roseburg, Oregon, began its PIPE training as part of the Oregon Department of Education–funded project in 2015, there were only four girls in its Welding program. During the action research phase of PIPE, the Pipeline team, led by instructor Sheri Carson, discovered through an equity environmental scan and student surveys that girls were not taking manufacturing courses (including welding) in part because the protective gear/clothing was, as students described it, "large." The team also discovered that the smaller-statured students, many of whom were girls, found it difficult to hold and utilize the equipment. The message girls were receiving was that this program was not for them.

With the full support and participation of the welding instructor, the team decided to implement four specific strategies to address the low participation of girls in the program. The first strategy was to invest $350 to purchase welding helmets, gloves and jackets in smaller sizes. Second, the school began a new Freshman Cruise class, in which all first-year students rotated through each of the school's CTE programs over a two-week period. During the welding rotation the instructor intentionally had the girls in the class demonstrate various welding techniques. Third, the school highlighted the Welding program and its female students in a community open house. Fourth, through funding from the Douglas Educational Service District, led by Analicia Nicholson, director of Instructional Services and PIPE site lead, the school used the NAPE *Explore Nontraditional Careers* toolkit with many of its instructors. They used the lesson plans to recognize and address cultural stereotypes and the ways in which implicit biases created barriers to students' success in nontraditional career preparation programs.

The results from these efforts, which were highlighted at the 2016 NAPE National Summit for Educational Equity,[2] were truly remarkable. The enrollment of girls in welding at Roseburg High School jumped from four in the fall of 2015 to 38 in spring 2016, a greater than 800 percent increase in only one semester! Past PIPE outcomes have ranged from doubling enrollment of underrepresented gender students to increasing retention and completion in targeted programs.

The success of the Roseburg implementation serves as an excellent example of the effectiveness of PIPE in identifying and removing key barriers to girls' participation in nontraditional programs. Once those barriers were identified and comprehensively addressed, a higher number of girls at the school saw that welding was fully open to them and took advantage of the program's offerings. The school ultimately purchased more than $1,200 in new equipment to accommodate the growth in the program.

Conclusion

In their Dear Colleague letter in June 2016, OCTAE and OCR stated that "all students, regardless of their sex or gender, must have equal access to the full range of CTE programs offered" (U.S. Dept. of Education, 2016). SEAs and LEAs have been required to set and meet targets relative to the participation and completion of students in nontraditional programs since the reauthorization of Perkins in 2006, and the nontraditional participation and completion measures have been in place since the reauthorization of Perkins

ACTE's CareerTech VISION 2016

Ben Williams will be presenting at the STEM is CTE Symposium on Saturday, Dec. 3, at ACTE's CareerTech VISION. Symposium participants will learn how NAPE's PIPE provides secondary and postsecondary educators with the tools to identify equity gaps in CTE/STEM programs of study by gender, race and ethnicity, and special populations. To find out more about the symposium, including registration information, visit

careertechvision.com/stem.cfm

in 1998. However, SEAs and LEAs continue to struggle to address these measures because the conditions that have led to the stubborn sex-segregation in many programs are complex and varied.

NAPE's Program Improvement Process for Equity, as evidenced by the success of Roseburg High School, provides a research- and evidence-based process for SEAs and LEAs to identify equity gaps through multiple lenses, uncover the root causes for those gaps, conduct action research to validate and understand the dynamics of those causes, identify and implement specific strategies to mitigate them, and evaluate the effectiveness and impact of those strategies. Diversifying the STEM workforce by removing barriers to access will ultimately have a positive effect on individuals, communities, businesses, the economy and our country as a whole (Morrell & Parker, 2015). **Tech**

ENDNOTES

1. NAPE is a professional alliance of federal and state agencies, local school districts, colleges, universities, businesses and corporate foundations whose focus is on building educators' capacity to implement effective solutions to increase student access, educational equity and workforce diversity in STEM and CTE. See more at **napequity.org.**
2. Visit **nsee.info** and click on "2016 NSEE" and then "2016 Conference Sessions" to read more about this session and view the presentation. The session was titled "Expanding Educator Perceptions of Career Pathways: Regional Implementation of NAPE's Explore Nontraditional Careers Toolkits."

Ben Williams, Ph.D., is the director of special projects for the National Alliance for Partnerships in Equity. In this role, he manages research and evaluation, as well as large-scale projects. E-mail him at bwilliams@napequity.org.

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