



# Evaluation of the Michigan Coalition for Advanced Manufacturing (M-CAM)

## *Executive Summary of the Final Report*

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Cover Photo: Brittany Schroeder, a CNC machining student at Lake Michigan, is using the lathe to face a piece of stock to length



Contributions from: Eduardo Ortiz, Antoinnae Comeaux, Mary Hancock, and Przemyslaw Nowaczyk.

# Executive Summary

## Background

The Michigan Coalition for Advanced Manufacturing (M-CAM) initiative was designed to help unemployed adults (including TAA-certified workers and veterans) gain the skills required to fill available jobs in Michigan's advanced manufacturing sector. The M-CAM initiative was developed by a consortium of eight community colleges in Michigan and funded by the U.S. Department of Labor's (DOL) Employment and Training Administration (ETA) under Round 3 of the Trade Adjustment Assistance Community College and Career Training (TAACCCT) grant program.

The M-CAM leadership team selected Social Policy Research Associates (SPR) as the initiative's third-party evaluator in March 2014. SPR's evaluation culminates in this Final Report, which describes key features of the initiative, factors influencing implementation, participant outcomes, program impacts, and systems outcomes. The report draws on four rounds of site visits to each college, case study interviews with students, a student survey, Efforts To Outcomes (ETO) data on student participation, and wage data from the state of Michigan. The report also draws on comparison data on over 4,000 students enrolled in Automotive and HVAC programs.

## Structure of Consortium and Management of Grant

The key entities in the M-CAM initiative included the Board of Advisors (made up of the Presidents of each college), Macomb as the lead college for the consortium, and the M-CAM operational staffs within the industrial trade, workforce and student services divisions at each of the eight colleges.

As the lead college, Macomb oversaw work plan implementation, convened meetings of colleges and key partners, reported on outcomes to DOL, and coordinated with contractors (including the third-party evaluator, technical assistance provider, and communications firm).

Each college in the consortium, with the exception of Bay, led at least one M-CAM activity. As an Activity Lead, a college was responsible for (1) developing a work plan for task execution, (2) convening colleges

- The M-CAM Consortium included eight Michigan Community Colleges: Bay de Noc, Grand Rapids, Kellogg, Lansing, Lake Michigan, Macomb, Mott, and Schoolcraft.
- The colleges used the \$24.9 million grant to update equipment and on-campus technology, enhance coordination and build capacity across the eight colleges, improve student access to career advising, and better align training to meet future labor needs of employers.
- The colleges focused on enhancing curriculum and hands-on learning opportunities with new equipment in four M-CAM pathways: Production, Welding, CNC Machining, and Multi-Skilled Technician/ Mechatronics.
- A key focus of the grant was on aligning training curricula across each of the eight colleges to industry standards and industry-recognized certifications.
- To develop a comprehensive career pathways system, colleges focused on developing intensive upfront assessment and career counseling, foundational skills training, and job placement services.

to discuss approaches related to the activity, and (3) developing a common M-CAM implementation approach.

## Student Enrollment and Training Completion

The M-CAM consortium and each individual college exceeded the TAACCCT-grant enrollment goals: the colleges enrolled 3,925 students in M-CAM, representing 143 percent of the cumulative enrollment goal. Macomb was the most successful at recruitment, in that it enrolled 1,348 participants (255 percent of its target).

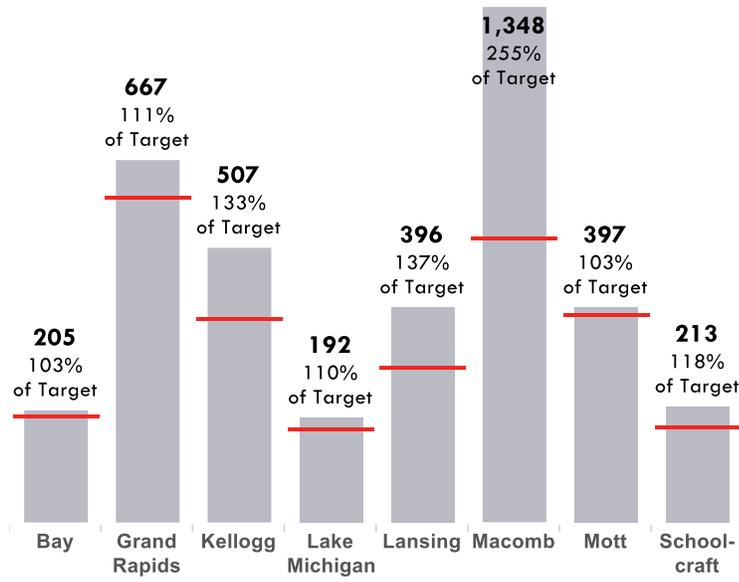
As of July 31, 2017, 25 percent of all M-CAM participants were still enrolled in advanced manufacturing programs. Fifty-six percent of all participants had completed and exited, while 19 percent had withdrawn from M-CAM programs without completing. The student survey results show that students who withdrew did so primarily because of life conflicts, rather than because of dissatisfaction with their training.

There was broad variation in the age and life-experience “profile” of students. Six in 10 M-CAM students were either over 40 or under 25 years of age. Students in these two groups typically varied greatly in their work experience, understanding of manufacturing trades, and life responsibilities. Furthermore, students who faced significant life challenges—housing instability, criminal history, transportation challenges—often viewed M-CAM as a vital “second chance.”

- Sixty-one percent of M-CAM participants were white males. Twenty percent of students were African American and 13 percent were female.
- The 31 percent of participants who were over the age of 40 often viewed M-CAM as a chance to upgrade their manufacturing skills to improve employment prospects. In contrast, the 28 percent of participants under the age of 25 were often still exploring career path options.
- Fifty-four percent of M-CAM participants were employed at the time of enrollment and looking to upskill so that they could move into higher paying manufacturing jobs.

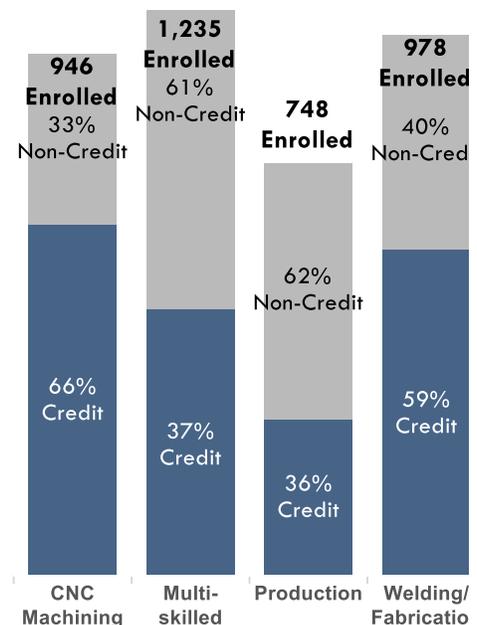
### Enrollment by College

Number of Participants and Percent of Enrollment Target Reached



----- Enrollment Target

### Enrollment by Career Pathway



## Recruitment Practices

The success of M-CAM colleges in surpassing their enrollment goals for the grant was particularly impressive given the broader context for enrollment at each of the colleges. Overall, enrollments across the M-CAM colleges declined over the course of grant implementation, mainly because of the thriving economy and the demand for labor among local employers. M-CAM staff members, therefore, had to be particularly aggressive in their recruitment efforts to ensure that programs were full and that they were reaching their target enrollment goals.

With the support of grant funds, colleges distributed pamphlets, conducted presentations at partner organizations, and advertised in local newspapers. These recruitment efforts influenced more than enrollment numbers: college staff members reported that the grant greatly increased the ability of colleges to market their programs and to increase awareness of manufacturing-sector training and employment opportunities. A staff member at Kellogg said, “M-CAM has helped to increase marketing... in industrial trade programs and occupations. The grant has put us on the map.”

## Foundations for M-CAM Training

M-CAM’s training programs were administered at the college level and, thus, the training curricula were developed independently at each college. Nevertheless, for the initiative to function as intended and realize its goals, the colleges in the consortium had to coordinate their work in identifying skills gaps, developing their training programs, and aligning them to industry standards.

To facilitate this process, M-CAM created a workgroup for each industry pathway made up of key faculty members, instructors, and staff members. These groups worked to make the curricula within each pathway more employer-focused across colleges in the consortium, identify appropriate industry-recognized professional certifications, enhance alignment with national industry-recognized professional certifications, develop technology-enabled learning strategies (e.g., hands-on learning, online coursework, online communities), and incorporate updated technology into the course content.

As key elements of their revamping of training programs, colleges selected and purchased new equipment and actively engaged employers to ensure that programs aligned with industry standards.

- Promising recruitment practices: (1) Presentations by employers and faculty at recruitment orientations helped prospective students understand the value and importance of training and (2) close collaboration with key partner agencies facilitated recruitment, particularly of vulnerable populations.
- Recruitment challenges included negative perceptions of manufacturing among students and their families, low entry-level pay in production, and limited college staff time dedicated to recruitment.
- The majority of the colleges spent between 20 and 40 percent of their grant funds on new equipment. These purchases increased the availability of hands-on, experiential learning for students on the types of equipment used by industry partners. Nearly half of the equipment purchased was used to strengthen the Multi-Skilled/Mechatronics pathway.
- M-CAM supported a tremendous infusion of new equipment for colleges, a number of which had had limited opportunities to invest in equipment prior to the TAACCCT grant.

## Employer Engagement

The colleges all had employer relationships prior to M-CAM, but the M-CAM grant required that they reconnect with their employer base and strengthen those relationships. M-CAM staff and faculty members worked with employers to inform all aspects of the implementation of the pathways model, particularly alignment of curricula with industry practices, standards, and credentials, and development of employment and work-based learning opportunities. In this process, the career coaches and job development staff members were instrumental in helping colleges reach out to employers and engage them in job placement and other activities.

Growth in employer partnerships over the life of the grant speaks to the consortium's deliberate efforts to actively engage employers in strengthening their career pathways. Consortium colleges engaged at least 188 employers they had previously not worked with and leveraged those connections in meaningful ways. Furthermore, over 60 percent of employers supported colleges in five or more ways, reflecting a deep level of engagement.

## Core Training Programs

M-CAM promoted improvements in noncredit and credit programs in the four advanced manufacturing pathways. Colleges made the following changes to training programs:

- The Multi-skilled/Mechatronics pathway experienced the most change. Ten new programs were developed, while 17 were enhanced. Programs were aligned with Siemens and Packaging Machinery Manufacturers Institute (PMMI) certifications.
- In welding, the colleges developed seven new programs and enhanced 15. Key changes included the addition of robotic welders and virtual welders and the opportunity for students to earn American Welding Society (AWS) certifications.
- Colleges developed two new programs in CNC machining and enhanced 14, primarily through the incorporation of new equipment and National Institute for Metal Working Skills (NIMS) certifications.
- Colleges developed at least six new production programs and enhanced four others with the addition of Manufacturing Skill Standards Council (MSSC) Certified Production Technician certifications.

- Across the consortium, the number of reported employer partnerships nearly doubled, from 204 in Fall 2014 to 392 in Spring 2016.
- 356 employers across the consortium (91 percent of total employer partners) assisted with job placement for students. These employers interviewed participants at colleges, participated in job fairs, and actively coordinated with M-CAM staff members to hire students. Two of the most common employer roles were posting job listings and coordinating with M-CAM job developers to hire students.
- Ninety percent of students surveyed were satisfied or very satisfied with the training they had received.
- There were no significant differences in student satisfaction by college or by career pathway.
- Students who were interviewed appreciated:
  - The high quality of instructors, who they viewed as having deep-levels of industry experience, and
  - The hands-on and applied approach to learning.

## Pathway Enhancements

M-CAM aimed to promote individuals' access to career pathways in manufacturing by strengthening students' academic and "soft" skills, allowing them to earn credit for what they already knew, and providing mechanisms for them to transfer credit from one institution to another. The colleges made the following changes to enhance career pathway supports for students:

- Colleges worked to strengthen students' foundational skills by harnessing and supplementing existing college resources, enhancing contextualized learning in core training programs, incorporating online basic skills testing and remediation, creating bootcamp-style pre-enrollment cohort programs, and providing supplemental workshops.
- Colleges used technology to enhance pathways. For instance, colleges incorporated Tooling U, MSSC online courses, Amatrol, and AMTEC into curricula to create hybrid course options and provide additional support.
- Colleges established agreements so that students could receive credit for coursework completed at one college (or high school) when transferring to another institution or, in the case of noncredit-to-credit articulation, when transferring from one division to another in the same college.
- The colleges identified industry certifications within each pathway, engaged their registrars in establishing equivalency values for each certification, and signed articulation agreements with other M-CAM colleges, as well as with two four-year colleges—Eastern Michigan University and Ferris State University.
- Although all M-CAM colleges had strategies for assessing prior learning and awarding credit for it, advancing the use of prior learning assessment (PLA) among advanced manufacturing students was not a strong focus of grant implementation. Rather, the focus was on articulating credit from noncredit to credit programs and across institutions using third-party industry certifications as a basis for determining what students had learned. The consortium presidents signed a written agreement allowing the use of third-party industry certifications for articulation across their colleges, which was a significant advancement given Michigan's decentralized community college system.

- Employer partners strongly emphasized the need for colleges to focus on strengthening students' "soft skills," such as punctuality and communication skills.
- M-CAM students who were interviewed generally wanted to focus on technical training and did not feel as though they needed support for "soft skills."
- Promising practices in promoting foundational skill development included:
  - Strengthening coordination between existing programs on campus
  - Offering more remediation in technical math
  - Having employers talk to students about the importance of "soft skills."
- Challenges to incorporating the teaching of foundational skills into manufacturing courses included resistance from faculty and low attendance at optional workshops
- Most colleges included online courses as an "optional" rather than a required component of the courses.
- M-CAM students were generally unaware that they could earn credit for prior learning.

## Counseling and Student Support

A key goal of the M-CAM initiative was to create an intrusive case management and career coaching system through which students would receive a wide variety of counseling and support services, including academic advising, help with educational planning, career coaching, job search and job placement assistance, and referrals for supportive services. With TAACCCT grant funding the colleges hired additional staff members with a variety of titles (e.g. career coaches, success coaches, intake and enrollment staff, and job developers) to provide these services. Colleges also bolstered student supports by strengthening on- and off-campus partnerships—with college admissions, advising and job placement offices, Michigan Works!, the Public Welfare Department, employer associations, and community- and faith-based organizations.

M-CAM career coaches interacted with students at a frequency that ranged from three times a week to once a month. During meetings with students, career coaches provided four core types of support.

- Academic support: Helping students select a career pathway and training program, choose courses and set up class schedules, navigate the college enrollment process, apply for financial aid, improve study skills, and access college tutoring services.
- Career information and counseling: Assisting students with developing or improving their resumes and developing cover letters; providing information on how to look for jobs and succeed in employment interviews.
- Assistance with job search and placement: Providing job announcements; assisting with job search; coordinating hiring events like job fairs; matching students to job or work-based learning opportunities.
- Help dealing with life issues: Providing counseling; referring students to supportive services such as financial aid, childcare, and transportation assistance.

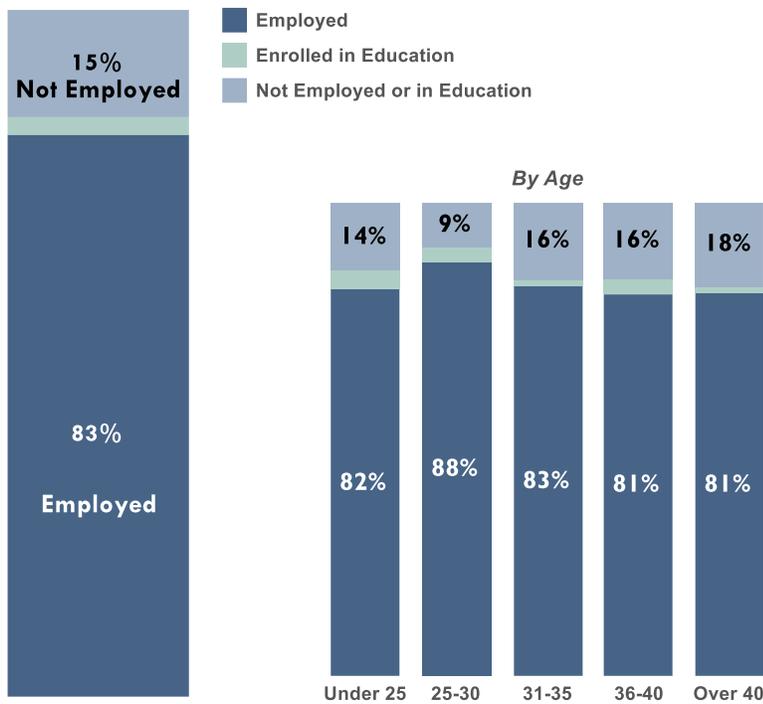
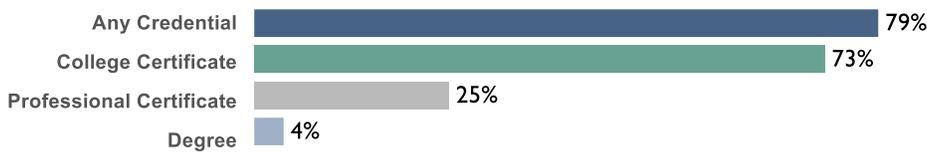
## Participant Outcomes

The M-CAM consortium strove to provide clear career pathways to well-paying advanced manufacturing jobs for participants. Measures of success in this area include the rate of program completion, certifications earned, employment placement, retention in employment, and average post-training wages.

- College leads reported that the largest “added value” of M-CAM was the enhanced counseling and student support services.
- The number of staff members providing counseling and supportive services at each college ranged from one to five.
- While M-CAM coaches were the main providers of student support, instructors at the M-CAM consortium colleges also advised students about academic planning and scheduling, provided them with instructional assistance and career advice, and, in some cases, helped connect them to jobs, internships, and apprenticeships.
- Among student survey respondents:
  - 91 percent were satisfied with the academic support services.
  - 90 percent were satisfied with help they received with life issues.
  - 85 percent were satisfied with career information and counseling.
  - 83 percent were satisfied with job search and job placement.

- Fifty-six percent of M-CAM students completed their studies and exited from M-CAM services (subsequent statistics are for these participants alone).
- M-CAM participants across the eight colleges earned 2,829 college certificates, 2,094 professional credentials, and 155 degrees. Seventy-eight percent of participants exited M-CAM services with at least one of these certifications.
- Eight-three percent of participants who successfully completed their programs were employed by the quarter after exit. One percent of participants were enrolled in further education and not employed, and fifteen percent were neither employed nor enrolled in further education.

Percent of Exiters Completing Credentials, Overall



- Older participants and African American participants were less likely than others to receive a college degree, regardless of their career pathway.
- Colleges awarded the following professional certifications: 941 AWS, 326 NIMS, 241 MSSC, 75 Siemens, and 73 PMMI. They also awarded OSHA 10 and Fanuc certifications.
- The percent of students completing any credential varied significantly by college.
- Sixty-eight percent of exited participants who completed our survey felt that their training helped them obtain their most recent job.
- 80 percent of those employed after exit were employed in manufacturing-related industries, compared to 65 percent prior to the program.
- Participants from all four career pathways and among all age groups attained high employment rates. There were no significant differences between groups, although participants between 25-30 were employed at the highest rate.

- The average wage exited participants received for new positions was \$13.66, well above the minimum wage in Michigan (\$8.90 as of January 2017) and above the living wage estimate of \$10.24 (the estimated hourly wage that an individual must earn to support himself or herself in Michigan).
- Seventy percent of incumbent worker participants who successfully completed their programs earned a wage increase after enrollment. On average, incumbent workers received an 11-percent wage increase as a result of M-CAM training.
- Of those that were employed at the time of program completion, 81 percent were still employed three quarters (approximately nine months) later.

## Impact Study Findings

The evaluation compared the employment outcomes for M-CAM students to a comparison group of students from the same colleges that enrolled in automotive technician or Heating, Ventilation, and Air Conditioning (HVAC) programs. The evaluation also conducted a historical analysis, comparing outcomes for M-CAM students to those that participated in advanced manufacturing programs at the colleges prior to M-CAM.

- M-CAM students had significantly higher employment rates and higher earnings than those in comparison groups of study, even after adjusting for differences between groups in baseline characteristics.
- After controlling for differences in characteristics, M-CAM students who were employed earned on average about \$500 to \$1000 more per quarter than students enrolled in the comparison group programs.
- The historical analysis showed that the enhancements brought about by M-CAM improved the probability that a student would find employment by at least 10 percentage points. The effect of M-CAM enhancements on earnings were less clear. (This analysis only included programs that had existed prior to grant implementation and that were “enhanced” with grant funds).

- Participants 36–40 years of age made the highest average hourly wage (\$14.90 per hour). Those 18–24 made \$12.55 per hour, and those over 40 \$14.35 per hour.
- Before enrolling in M-CAM, incumbent workers had an average wage of \$15.91; after completing their programs they made, on average, \$17.25 per hour.
- Among incumbent workers, the value of participating in M-CAM programs seemed to be highest for workers between the ages of 25 and 40.
- African American participants earned lower wages on average than their white counterparts and were less likely to receive a wage increase if they were employed at enrollment.
- Women received lower wages than did men, but if they were incumbent workers then they were just as likely as men to get a wage increase.
- Employment rates for M-CAM students were 10–22 percentage points higher than for students enrolled in automotive or HVAC programs at the same colleges, during the same time period.

## Systems Outcomes

The M-CAM initiative played an important role in strengthening partnerships and making structures and processes at the system level more conducive to supporting career pathways in advanced manufacturing.

- Consortium colleges deepened their engagement and collaboration with industry associations and employers, the public workforce system, nonprofit and community-based organizations, and four-year educational institutions.
- M-CAM funding helped bridge the divide between noncredit and credit programs and helped bring greater awareness of advanced manufacturing programs to college administrators, employers, and prospective students.
- By aligning programs to industry-recognized standards and using third-party industry certifications as a basis for awarding academic credit, the colleges built cross-consortium consistency into their training programs.
- The colleges leveraged the M-CAM grant to obtain additional resources that allowed them to purchase and upgrade equipment, expand facilities, and integrate intrusive case management services for advanced manufacturing students into their service delivery systems.
- Efforts to adequately and reliably track M-CAM student outcomes led to improved, even transformative, changes in how the colleges gathered and reported program-level data and used it to document employment-related outcomes and growth in partnerships and to inform decision-making.

## Further Research

The positive educational and employment outcomes that emerged from M-CAM are a sign of what can be accomplished when colleges provide additional support to students and partner closely with employers. The impacts achieved by the program are in keeping with a growing body of research showing the effectiveness of regional sector-driven workforce initiatives. Moving forward, it would be valuable to explore what it is about sector-based initiatives like M-CAM that lead to impacts. It would also be valuable to better understand how students intersperse learning and work in a career pathway model over time and to examine in more detail the differences in outcomes seen in older vs. younger workers, women vs. men, and African Americans vs. whites so that the colleges could more effectively serve specific populations. Finally, given stagnating wages at the national level, it would be useful to better understand how various factors—particularly those related to automation—influence wage growth in advanced manufacturing.

- M-CAM increased coordination between colleges in Michigan, which is notable given that the colleges operate in a decentralized system.
- The colleges designed clear, coherent career pathway models for M-CAM’s four career pathways—Welding/Fabrication, CNC Machining, Multi-Skilled Technician/Mechatronics, and Production.
- The colleges used the grant as an opportunity to “move the needle” on data access and availability. Several college presidents met with the Director of Michigan’s Talent Investment Agency (TIA) to discuss the importance of data sharing and data access. At the time of our report, the Michigan Legislature was considering an expansion of the state’s Social Security Act expanding access to wage data for community colleges and their evaluators.