Evaluation of Clark State Community College's Advanced Manufacturing to Compete in a Global Economy (AMCGE) Training Program

Final Report Executive Summary

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TAACCCT Program/Intervention Description and Activities

Project and Purpose

The Clark State Community College (CSCC) Advanced Manufacturing to Compete in a Global Economy (AMCGE) Training Program was tasked with creating pathways to work in welding and advanced manufacturing for community college students in the Springfield, Ohio area. The intention of the grant was to increase CSCC's capacity to address the workforce needs of area employers through the development or reform of five certificate programs (Additive Manufacturing, CNC, Industrial Maintenance, Supervisory Control and Data Acquisition, and Welding) that were embedded two AAS degrees (Industrial Technology, and Manufacturing Engineering Technology). Additionally, the school sought to incorporate developmental education into the technical curriculum, smoothing the pathway for students who required pre-college training. The school also added a Career Navigator position, co-located with the Ohio Department of Job and Family Services (OJDFS), to offer intensive advising and wraparound services. The project required the school to develop or expand employer engagement with the programs.

Interventions

The following key project implementation strategies were evaluated:

Intervention	Proposed Change Effect
Develop a modularized curriculum and embed five new certificates of competency.	Allow multiple entry and exit points for non-traditional and incumbent-worker students; create career pathways leading to advanced manufacturing and welding jobs while facilitating future higher education.
Develop an I-BEST-like approach to integrate remedial education into career training.	Remove educational barriers for at-risk students; accelerate coursework; improve program completion
Develop competency-based programs and methods to observe and measure student proficiency.	Ensure that students learn and demonstrate work-related skills; facilitate entry into the job market.
Add prior learning assessments to facilitate articulation of prior learning, such as non-credit courses and military experience.	Accelerate path to certificates/degrees for non-traditional students with prior work experience.
Incorporate technology and expand technology-enabled learning.	Provide "real world" simulations to reinforce technical training; facilitate remote learning.
Provide academic and career counseling to students enrolled in advanced manufacturing programs.	Identify and remove barriers to success for students; increase retention and completion; increase job placement.
Engage with employers through "employer engagement teams" to interview and select students for the program; provide assistance	Increase employer buy-in for programs; ensure that training imparts skills in-demand

in curriculum development, providing work-based learning opportunities, and identifying job opportunities for graduates.	in the local job market; provide experiential education; place students in jobs.
Coordinate with the public workforce system and align with statewide workforce plans.	Connect with TAA and disadvantaged workers; facilitate wraparound services for students as needed
Engage with collaborating educational institutions and previously funded TAACCCT grants.	Learn from similar programs to facilitate overall program success.

The following components of the above-listed interventions were evaluated:

- Renovation of lab spaces and introduction of new equipment
- Development of modularized, stackable curriculum
- Use of online learning including simulations and technology-enabled learning
- Integration of developmental education by expert consultants
- Formalization of prior learning assessments
- Use of a career navigator co-located with OJDFS
- Employer engagement
- Coordination with the public workforce system
- Recruitment, program completion and job placement

Populations Served

AMCGE programs were meant to primarily serve adult or otherwise nontraditional students from Springfield and the greater West-Central Ohio region, either with or without experience in manufacturing.

Evidence-based Model

The proposed strategies used in the AMCGE project were based on research about career pathways, integrated learning, prior learning assessments, advanced learning online and technology enabled learning, and employer engagement strategies. Career pathways have been shown to help hard-to-employ adults to achieve immediate short-term gains as well as long-term successes (Gash and Mack 2010), improve student success rates (Jenkins and Sung-Woo 2012), and facilitate program graduates who are better prepared for employment and have better employment outcomes (Maguire et. al 2010), Research indicates that the I-BEST model of integrated developmental education could improve student outcomes such as college credits, vocational credits, and occupational certificates and degrees earned (Jenkins et. al 2009). Prior learning assessments were demonstrated to improve persistence and graduation rates and decrease time to degrees (Brigham 2010). Online learning has been shown to have similar educational outcomes as traditional in-class learning (Neuhauser 2002, US Department of Education 2009), and that students who have practical experiences and hands-on learning opportunities experience better success (Benson et. al 2005). Studies demonstrate that strong employer engagement helps improve the performance of career ladder programs (Maguire et. al 2010).

Evaluation Design Summary

Goals of Evaluation

EERC's evaluation of the AMCGE program, including its implementation and outcomes, was based on a program logic model (see Appendix A) that the EERC evaluation and Clark State implementation teams built collaboratively at the beginning of the project. and was revisited twice yearly with the project manager and adjusted if necessary to accurately reflect the project activities. The logic model for the evaluation summarizes how the program's planned work (program inputs and activities) and how it led to its intended results (short-term outputs, outcomes, and longer-term impacts). This ensured that all stakeholders, including the evaluators, focused on the same roadmap and had a shared understanding of the detailed plan and goals of the project.

While specific questions are described in both the implementation analysis and outcomes analysis sections that follow, the general overarching questions guiding the evaluation include:

- What strategies and activities for career pathway development has Clark State implemented? To what extent have these strategies and activities been implemented as expected? If not, why not?
- Who are the key employer and workforce partners of Clark State's advanced manufacturing TAACCCT grant? How do they work with Clark State? What are the successes and challenges in these relationships?
- What are the educational outcomes of Clark State's advanced manufacturing participants? What are the employment outcomes of Clark State's advanced manufacturing participants?
- What are the experiences and perceptions of Clark State's students in advanced manufacturing programs? To what extent have the programs met students' educational and workforce needs?
- What are the experiences of employers who hire graduates from Clark State's advanced manufacturing programs? To what extent do they feel that graduates have the skills they need to be successful at work?

Data for evaluation were collected in a variety of ways and from numerous sources, including:

- Formalized site visits to the college
- In-person and telephone interviews with faculty and staff employers
- Review of college and program documents
- Student surveys
- Student administrative data
- In-person and telephone interviews with employers
- Employer-contacts survey

Implementation Study Design

The implementation evaluation was guided by several broad research questions. More detailed research questions were also posed for many of the activities and interventions in the grant. Those are discussed throughout the main report.

Implementation Study Questions:

The implementation assessment will focus on several sets of specific research questions pertaining to the grant implementation, including both the questions outlined in the SGA and a set of questions further customized to the design of the Advanced Manufacturing Career Pathways Training program:

Grant activity design and administration

- What are the goals of the grant activities?
- What resources are used to achieve those goals?
- How do the proposed activities help achieve those goals?
- How were programs and program designs improved or expanded using grant funds?
- How are grant activities enhancing existing efforts to implement guided pathways in advanced manufacturing?
- What are the administrative structures of the activities?
- What support services and other services were offered?
- Did the program achieve its milestones in the work plan as intended and on time? If not, why not?
- Are the program changes sustainable after the end of the grant?

Curriculum: strengthening guided pathways

- What was the program's process for selecting and developing curriculum and activities?
- What instructional methods did faculty use to facilitate IT programs?
- How did faculty professional development in the I-BEST model influence instructional methods in Advanced Manufacturing programs?
- Did the program purchase and install equipment for dedicated Advanced Manufacturing labs and classrooms?
- How did the presence of new or improved dedicated Advanced Manufacturing labs and classrooms supplement the program curriculum, activities, and the instructional methods used in Advanced Manufacturing programs?
- Are program graduates' employers satisfied with the level of preparation that the program provided for jobs in Advanced Manufacturing?

Student assessment

- Are in-depth assessment of participant abilities, skills, and interests conducted to select or enroll individuals into the Advanced Manufacturing Career Pathways Training program? What assessment tools and process were used? Who conducted the assessments? How were the assessment results used? Were the assessment results useful in determining the appropriate program and course sequence for participants?

- Was career guidance provided? If so, through what methods?
- How are students requiring remediation evaluated in the I-BEST classroom? What are the goals for instruction and how do the instructors know if these goals are met? What happens to students who do not meet these goals?

Partner roles/contributions: employer and workforce system engagement

- What contributions did each of the partners and other key stakeholders make towards: 1) program design, 2) curriculum development, 3) recruitment, 4) training, 5) placement, 6) program management, 7) leveraging of resources, and 8) commitment to program sustainability?
- To what extent did relationships with employers and workforce system partners change the type of student recruited to the programs?
- What factors affected workforce and employer partner involvement or lack of involvement?
- Which contributions from partners were most critical to the success of the grant activities?
- Which contributions from partners had less of an impact?
- Was the program able to implement internships or other types of work-based learning with employers? Did these experiences connect students with employers who would provide them with paid employment upon graduation?

Implementation challenges and modifications

- In what ways have the activities been modified in its implementation compared to the original implementation plan?
- To the extent that modifications were made, why did Clark State Community College make these changes?
- What barriers were encountered during implementation?
- To what extent did goals change during the course of implementation? Why did these goals change?

Outcome Study Design

The outcomes evaluation was broken into two main analyses—a descriptive analysis of student outcomes, and a quasi-experimental analysis using propensity score matching for student outcomes... More detailed research questions were also posed for many of the student and program outcomes. Those are discussed throughout the main report.
Outcomes Study Questions:

The outcomes analysis was guided by several key research questions:

- Are the expected numbers of students retained in the programs, completing the programs, and gaining improved employment?
- Are there statistically significant differences in retention, completion, and credential attainment between advanced manufacturing students and comparison group students?

- Are there statistically significant differences in employment, earnings, employment retention, and advancement between advanced manufacturing program graduates and comparison group program graduates?

Implementation Findings

Institutional Capacity

Growing AMCGE's institutional capacity centered around developing multiple certificate programs that offer a community-focused pathway for students to quickly enter the local manufacturing workforce. As data show that certificate holders in manufacturing can become employed in numerous positions, the AMCGE program was designed to institutionalize manufacturing instruction and curriculum for the greater Springfield area.

Although Clark State had previously designed manufacturing related programs with the intentions of having students complete before entering the workforce, AMCGE was instead implemented with the goal of modularizing curriculum in a way that students could have multiple entry and exit points, which would still lead to stackable credentials, such as certificates or degree. Also emphasized in curriculum was a reformed model of developmental education, using an I-BEST approach (see main report) to integrate remedial education into career training.

Also key to institutionalization was the creation of the online learning lab and hands-on learning lab, which is now home to industry-relevant robotics equipment. These labs were a product of employer input, and also used as a recruitment tool to attract students and to gain support from area employers.

Key Steps Taken at Program Level

The AMCGE found success in reaching its goals taking key steps through different areas of the program, including project organization and staffing, curriculum, career navigator model, recruitment, and employer and workforce system engagement.

Key Steps:

- Project organization and staffing
    - Collaboration between both project director and project manager
    - Collaboration among teacher leadership with background in industry
    - Career Navigator autonomy and co-location at local workforce system
- Space and Equipment
    - Purchasing of labs based on employer input
    - Purchasing of robotics equipment based on employer input
- Curriculum
    - Built on two pre-existing programs in Manufacturing Engineering Technology (CNC and Industrial Maintenance)

    - Added three new programs (Welding, Additive Manufacturing, and Supervisory Control and Data Acquisition)
    - Created a 4-year applied baccalaureate degree
    - Add prior learning assessments with the help of an expert consultant
    - Integrated technology-enabled learning with new manufacturing and simulation equipment
    - Developed I-BEST by integrating developmental education into regular technical courses
    - Embedded local employers and subject matter experts to consult with faculty
    - Developed a student tracking system to better understand student outcomes

- Career Navigator Model
    - Provided academic and career counseling to Advanced Manufacturing students with a full-time navigator
    - Co-located career navigator at both college and in workforce system to accept referrals throughout the service area

- Recruitment
    - Developed recruitment strategy with promotional materials and website
    - Adjusted intake process to increase individualization
    - Leveraged college and external resources to assist students (with emphasis on Veterans population)
- Employer and Workforce Engagement
    - Engaged employers through "employer engagement teams"
    - Coordinated with public workforce system and aligned with statewide workforce plans
    - Engaged with local 4-year schools to create articulation agreements

Strengths and Weakness at the College Level

There were instances of both success and setback throughout the AMCGE program. Relative to strengths, AMCGE was able to:

- Use specially designed technology and equipment across programs
- Create a new lab and collaborative area for the manufacturing program
- Modularize curriculum to create fully stackable programs
- Create 5 new or reformed certificate programs
- Overhaul PLA assessments
- Increase number of students in Advanced Manufacturing programs
- Increase number of employers informally engaged with programs and curriculum
- Develop articulation agreements with local 4-year schools

Relative to weaknesses AMCGE faced challenges:

- Transferring PLA credits to other Ohio institutions

- Working for almost a year without a navigator
- Maintaining career navigator influence without the career navigator (post grant)
- Formalizing relationships with employers

Participant Impacts and Outcomes

Over the course of the 3-year grant period, AMCGE served hundreds of students pursuing multiple credentials:

- A total of 397 students, although many students pursued more than one credential.
- The latest data for 2017 show that enrollment was on track to be larger than the previous two years.
- Over 200 students participated in AMCGE in any given year of the grant

The students served by AMCGE were:

- 89.2% male
- 76.3% white; 11.1% African-American
- 10.3% veteran or veteran spouse
- 55.9% developmental education
- 54.4% nontraditional (25 and older)
- 64% part-time

AMCGE served students in terms of credit attainment, certificates, and associate degrees earned:

- 18 AAS degrees and 101 certificates were awarded throughout the grant
- The most common credential earned was the Manufacturing Foundations Certificate (N=52)
- The majority of AMCGE students completed a credential or were retained in the first year after program exposure
- The average total credits earned for first-time engineering students in first year of program exposure was 12.1
- The majority of AMCGE students completed a credential or were retained in the first two years after program exposure
- The average total credits earned for first-time engineering students in first two years of program exposure was 16.7
- 17.9% of first-time engineering students completed a certificate or degree in the first two years of program exposure; 48.7% were retained and 33.3% were no longer enrolled during the same period

The quasi-experimental analysis using propensity score matching also evaluated the impact of AMCGE on Clark State Engineering students, and focused on three academic outcomes—completion, retention, and credits earned:

- AMCGE had a statistically significant positive impact ($p<.05$) on students' short term graduation rates and accumulation of credits, however, the long term influence is not currently evident. See main report tables for further analysis.

Limitations

The main limitations involve the propensity score matching analysis and its small sample size of 200 students per academic year, as well as the short duration of the time observing engineering students (2 years at most). Moreover, other factors that are not in the administrative data, such as family and social background, may also contribute to the outcomes, but are unable to be included in this analysis.

Conclusions

The key takeaways from AMCGE fall into three categories: students, college, and community. Additionally, the career navigator model was an effective tool in order to communicate the value of the certificates and pathways to students. However, in the navigator's absence, the negative effects were also felt in the programs, without the wraparound services it provided with the help of the workforce development system.

At the college level, there was significant collaboration with employers and their presence was felt on campus, albeit mainly informally. First, at the student level, the creation of the 4-year baccalaureate—which will continue after the grant—through coordination from industry, is an example of how AMCGE sought to sustain the key elements of the grant that were beneficial to both students in finding manufacturing jobs, as well as the industry employing them. The PLA overhaul was also a strongpoint of AMCGE, especially because it did not just encompass the program, but all of Clark State, and created a formal, well-communicated system that may be implemented more uniformly moving forward than the ad hoc PLA policies often seen in schools. Additionally, the I-BEST focus offers a potentially sustainable model for remedial education, especially because it coincides with college-level credit-bearing coursework.

At the community level, it may be too early to assess the impact of AMCGE. However, through recruitment strategies and outreach to employers and local workforce partners, the program has significantly increased Clark State's profile in the community. The program has been useful in recruiting new companies to the area, which may be an early sign that the impact of the program will be very positive for the local area.

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