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Aligning the Workforce and Education System for Manufacturing (AWESM) SCC1 Final Report

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AWESM PROJECT
EXECUTIVE SUMMARY

This final evaluation report reviews the AWESM project's outcomes and impact in aligning education with advanced manufacturing workforce needs. It documents achievements in employer engagement, curriculum development, digital badging, Credit for Prior Learning, and holistic student support, while highlighting lessons learned and opportunities for sustainability.

Why AWESM?

According to the North Carolina Department of Commerce (NC-Commerce), manufacturing accounts for about 100,000 jobs in the 12-county Piedmont region. Furthermore, the region consists of more than 275 manufacturing-related registered apprenticeship programs in which employers support technical and general education while employing students. The high number of opportunities available is evidence of the ongoing demand for skilled workers. However, gaps in the education-workforce system are apparent in the wake of the COVID-19 pandemic.

Process

Lack of a structured process for assessing the skills and experience of unemployed workers and awarding college credit for prior learning (CPL).

Best Practices

No common practices for articulating workforce training to college credit.

Precedent

Absence of a common language for colleges and manufacturing-sector employers to describe core knowledge, skills, and abilities (KSAs) needed from training.

Awarded in 2021 to Forsyth Technical Community College, the Aligning the Workforce and Education System for Manufacturing (AWESM) Consortium grant was designed to make systems-change enhancements to education and occupational training for machinists, industrial systems technologists, mechatronic technicians, and welders with the aim of increasing the number of workers regionally for these positions. The Consortium is comprised of eight community colleges in North Carolina.

Alamance Community College | Davidson-Davie Community College | Forsyth Tech Community College | GTCC Guilford Technical Community College | Montgomery Community College | Randolph Community College | Rockingham Community College | Surry Community College

Activities of the AWESM Project

The AWESM project sought to reach high school graduates, incumbent workers, and underemployed workers within the fields of machining, industrial systems technology, welding, and mechatronics. To further its goal to align the workers' skills with employer goals, the AWESM project engaged in the following activities:

BILT Recruitment

The AWESM project successfully expanded the Business and Industry Leadership Team (BILT) framework to align regional manufacturing education with industry needs. By Year 4, 118 employers actively participated in the BILT, far exceeding the initial goal of 50. This achievement reflects significant progress in building a robust employer network. Regional and local BILT meetings facilitated collaboration between colleges and industry. Consortium colleges enthusiastically embraced the BILT model, hosting meetings that showcased their facilities and capabilities. Several institutions also hired dedicated staff to strengthen industry engagement and ensure sustainable participation in the BILT process.

BILT Engagement

The BILT's prioritization of Knowledge, Skills, and Abilities (KSAs) ensured alignment between curricula and workforce requirements. The process initially focused on machining and expanded to welding, mechatronics, and industrial systems technology. BILT sessions facilitated consistent and ongoing dialogue between educators and industry leaders, helping to ensure that curriculum development kept pace with evolving workforce demands. Employers provided regular feedback, which was instrumental in identifying and refining KSAs. Surveys indicated high levels of employer satisfaction with the process, with many reporting that BILT participation offered valuable insights into industry trends and helped shape curriculum decisions. Additionally, virtual meeting options improved accessibility, enhancing participation among industry representatives who faced logistical challenges. The introduction of structured pre-meeting materials, such as agendas, slides, and pre-read content, further improved engagement and the productivity of discussions. collaborative atmosphere. Networking opportunities within BILT meetings also strengthened relationships between colleges and employers, laying the groundwork for sustained partnerships beyond the project's conclusion.

Course Development

The project prioritized the development of regionally standardized courses to enhance career pathways in advanced manufacturing. Faculty across consortium colleges collaborated to align curricula with BILT-defined KSAs. As of Year 4, 13 standardized courses in machining and welding were completed and uploaded to open educational resource platforms, with nine additional courses in progress. These efforts included the integration of micro-credentials, ensuring students could earn industry-recognized badges alongside course credits. Each course underwent a rigorous development process, including input from industry experts, ensuring alignment with real-world job requirements. Regular review sessions with faculty and industry partners allowed for iterative improvements, guaranteeing the content remained relevant and practical. The focus on standardization also enabled seamless credit transfer across consortium colleges, reducing barriers for students who need to move between institutions. To support diverse learning needs, courses incorporated a mix of theoretical and practical elements complemented by digital tools and resources. The innovative use of open educational platforms ensures broader accessibility to these standardized courses, providing long-term value for the region's workforce development initiatives.

Credit for Prior Learning

The project significantly advanced CPL initiatives, enabling students to earn credit for previous education, work experience, or military service. Despite early challenges, including staff turnover and state-level delays, the consortium standardized CPL processes and developed a comprehensive CPL Guidebook. By Year 4, 51 students had earned CPL, and 222 credits were awarded, exceeding the project's goals. The CPL initiative included the creation of a repository of standardized assessments, allowing colleges to evaluate prior learning consistently and equitably. Military personnel were a key focus, with expanded opportunities to translate military training into academic credits. The project also worked closely with the North Carolina Community College System (NCCCS) to integrate state-level credential crosswalks, aligning CPL efforts with broader educational standards.

Efforts to raise awareness about CPL included training sessions for faculty, staff, and students to better understand the processes and benefits. In addition, a dedicated CPL webpage was developed that the consortium colleges could use as a template for creating their own. Ongoing marketing initiatives and partnerships with local industries further amplified the visibility of CPL options. Students and faculty reported high levels of satisfaction with the streamlined processes and transparent criteria for earning CPL. Faculty particularly valued the ability to assess students' prior experiences in a structured manner, while students appreciated the reduced time and cost associated with completing their programs.

Digital Badging

Competency-based digital badging was a cornerstone of the AWESM project, aligning educational outcomes with industry expectations. By 2024, 59 of the targeted 70 badges were developed, and 710 individual badges were awarded to students. Delays in statewide guidelines temporarily hindered badge implementation; however, the project's partnership with platforms like Credly and Credential Engine ensured progress. Digital badges linked directly to BILT-defined KSAs, providing students with verifiable credentials to demonstrate job readiness.

To enhance badge utility, the project emphasized industry adoption by educating employers about the value of digital badges in recruitment and workforce development. Workshops and webinars were held to familiarize industry leaders with badge functionality and integration into hiring processes. Additionally, badges were designed to be easily shareable on professional platforms like LinkedIn, increasing their visibility and appeal. The collaboration with industry ensured that badge content directly reflected the skills employers sought, strengthening their credibility as a recruitment tool. Student feedback highlighted the motivational value of earning badges, as they provided clear milestones for skill acquisition and recognition.

Student Support

Holistic student support services played a pivotal role in the AWESM project's success. These services included success coaches, tutoring, career planning, emergency aid, and social services referrals. The consortium's proactive engagement with Workforce Development Boards (WDBs) resulted in over 500 Workforce Innovation and Opportunity Act (WIOA) participants, surpassing the original target of 74. Collaborative efforts with regional WDBs also supported the development of pre-apprenticeship and apprenticeship programs, enhancing career opportunities for students.

To address non-academic barriers, such as financial constraints and childcare, the project partnered with over 350 public and private entities to provide holistic support. Services included transportation assistance, food security programs, and access to mental health resources. The consortium also leveraged Higher Education

Emergency Relief Funds (HEERF) to expand student support offerings during COVID-19 pandemic. Success coaches played a vital role in guiding students. They provided individualized support, conducted regular follow-ups, and connected students with additional resources. Workshops on career readiness and personal development further enhanced student outcomes, equipping them with the skills needed for long-term success. Surveys indicated high levels of satisfaction among students with the support services provided. Some colleges are retaining AWESM-funded positions to sustain student support, alongside increasing awareness and partnerships for holistic support.

Evaluative Goals and Approach

Four individuals from The Rucks Group comprise the external evaluation team to guide the creation and implementation of this evaluation. The Rucks Group has extensive knowledge of evaluating grants funded by federal agencies, like the DOL, the National Science Foundation, and the Department of Education, as well as state and local entities, with particular emphasis on STEM education and workforce development. The evaluation is guided by the project's logic model and theory of change which posits that project's activities will lead to a more coherent, less fragmented education-workforce development system that will ensure a match between workers' skills and employers' expectations resulting in an increased number of adults with well-paying jobs. The evaluation strategy is broken into three phases: developmental evaluation; implementation evaluation; and short-term outcomes evaluation.

Developmental Evaluation	Implementation Evaluation	Short-Term Outcomes Evaluation
Co-creating evaluative measures, identifying topics for assessing needs and focus on resources, and building evaluation capacity and evaluative thinking with the Grant Management team.	Developing understanding for how effectively activities and strategies are being implemented and includes efforts to identify what is working well in terms of implementation and any improvement opportunities.	Capturing evidence regarding the extent to which the Grant Management team is meeting its outcomes goals related to the project's activities and strategies.
(Years 1-5)	(Years 1-5)	(Years 2-5)

Data Collection and Analyses

Various sources of data and measures were used to collect data for the developmental, implementation, and outcomes evaluation efforts conducted during the first eight quarters of the project. To date, these sources have included project-level documents (i.e., meeting notes, recruiting, and marketing materials), institutional and organizational data (i.e., enrollment), and surveys. Quantitative data gathered through documents, records, surveys, and interviews were analyzed with IBM SPSS with descriptive statistics to provide informative summaries of outcomes data, including frequencies (e.g., counts), central tendencies (e.g., means), and variation (e.g., cross-tabulations or standard deviations). Qualitative or open-response data from surveys and interviews were thematically analyzed and coded to identify common topics, ideas, and patterns.

Populations The populations of interest included regional employers who hire employees in the targeted field, teachers from the eight participating consortium schools who are teaching courses in the targeted areas, and students at the eight consortium schools who are taking courses in the targeted areas. Given the feasibility of reaching each member of these populations, data collection efforts included a full census rather than sampling. Steps were taken to maximize individual response rates through strategies including invitations that stated the purpose and use of the surveys, tracking non-response, and sending email reminders.

Key Findings and Insights per SCC1 Core Element

1. **Sector Strategies & Employer Engagement:** The AWESM project effectively used the BILT model to engage 118 employers, exceeding its goal of 50 and ensuring that educational programs were aligned with industry needs, resulting in high employer satisfaction and stronger partnerships.

2. **Enhanced Career Pathways Programs & Accelerated Learning Strategies:** The project developed 13 regionally standardized courses with more in progress, creating clear pathways for students. These courses integrated theoretical and practical components, ensuring alignment with workforce demands while facilitating credit transfer between institutions.

3. **Strategic Alignment to Workforce Development Systems:** The project exceeded its target by supporting over 500 WIOA participants and partnering with 350+ entities to address non-academic barriers. These holistic support measures included transportation, childcare, and financial aid, directly contributing to student retention and success.

4. **Systems Change/Accelerated Learning Pathways:** AWESM introduced 59 digital badges linked to industry-defined KSAs, with 710 badges awarded. These badges provided students with verifiable credentials, motivating skill acquisition and enhancing job readiness. Partnerships with industry helped integrate badges into hiring processes, increasing their utility and adoption.

Lessons Learned and Recommendations

The AWESM project faced several challenges during implementation, including inconsistent engagement from initially skeptical industry partners, staff turnover in key roles, and coordination complexities across eight consortium colleges with varying schedules and priorities. Despite challenges, the project achieved significant milestones. Employer engagement exceeded expectations, with 110 partners actively participating in aligning educational programs with industry needs. Regional collaboration fostered standardized curricula and modular credentials, such as digital badges, and the creation of accessible pathways for non-traditional learners.

These and other successes underscore the project's impact in transforming workforce education systems. To sustain momentum, recommendations include integrating digital badges into employer practices through targeted outreach, maintaining regional networks via regular meetings, and enhancing marketing efforts with digital campaigns, success stories, and a centralized information portal. By prioritizing these strategies, AWESM can continue driving innovation and serving as a model for workforce development initiatives.

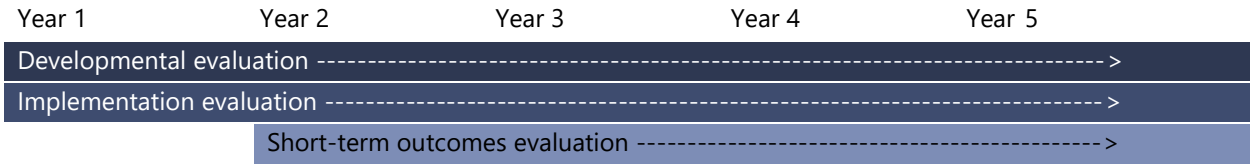
INTRODUCTION AND BACKGROUND

Introduction

The Aligning the Workforce and Education System for Manufacturing (AWESM) Consortium grant is designed to make systems-change enhancements to education and occupational training for machinists, industrial systems technologists, mechatronic technicians, and welders with the aim of increasing the number of workers regionally for these positions. The Rucks Group, LLC[1] was contracted to provide external evaluation services for the AWESM project, as required by the Department of Labor Strengthening Community College (DOL SCC) program and works collaboratively with project leadership to carry out the evaluation activities. Four individuals from The Rucks Group comprised the external evaluation team to guide the creation and implementation of this evaluation. The firm has extensive knowledge of evaluating grants funded by federal agencies, like the DOL, the National Science Foundation, and the Department of Education, as well as state and local entities, with particular emphasis on STEM education and workforce development.

The evaluation was guided by the project's theory of change and the logic model (Appendix A) and was framed by the research questions. The theory of change posited that the project's activities will lead to a more coherent, less fragmented education-workforce development system that will ensure a match between workers' skills and employers' expectations resulting in an increased number of adults with well-paying jobs.

This evaluation strategy consisted of three strategies, including developmental evaluation, implementation evaluation, and short-term outcomes evaluation (see Figure 1).



The developmental evaluation phase began at the start of the project and continued over the project's life. The goal of this phase was to co-create evaluative measures, identify topics for assessing needs and focus on resources, and build evaluation capacity and evaluative thinking with the Grant Management team.

Developmental evaluation "supports innovation development to guide adaptation to emergent and dynamic realities in complex environments" (Patton, 2010). For this project, stakeholders provided feedback and input to help the Grant Management team gain a better understanding of the current state of the various aspects being targeted by the project at their schools, such as the use of educational technology and existing Credit for Prior Learning (CPL) practices and policies. It includes efforts to identify the training/educational needs of instructors, particularly as they relate to adopting and using educational technology in their classrooms, to ensure that they have the skills necessary to leverage the technology appropriately. The developmental evaluation also involved capturing data to determine instructors' and employers' satisfaction regarding the project's activities and strategies related to the identification and development of common knowledge, skills, and abilities (KSAs)

[1] https://therucksgroup.com/

mapped to curricula as well as data gathering efforts to assess the extent to which employers and instructors are expressing attitudes and engaging in behaviors that demonstrate support for the project's activities and strategies.

The implementation evaluation also began at the start of the project and continued over the project's life. It focused on how effectively activities and strategies are being implemented and included efforts to identify what is working well in terms of implementation and any improvement opportunities that had been identified and leveraged. The implementation evaluation also included efforts to help the Grant Management team identify and address challenges and barriers that emerged.

The short-term outcomes evaluation phase began with the collection of data starting at the end of the first year of the project and continued through the end of the project. This phase focused on capturing evidence regarding the extent to which the Grant Management team was meeting its outcomes goals related to the project's activities and strategies (e.g., the number of participants earning digital badges, the number of candidates available for jobs in the targeted areas) and the extent to which the activities and strategies improved the feasibility, speed, and cost for acquiring the credentials needed for a desired job.

The full set of evaluation questions addressed through the evaluation plan is provided in a later section but the broad evaluation questions addressed through this evaluation include:

1. **Developmental**: Satisfaction among instructors and students with the project at their institution; identification of training needs; satisfaction related to the curriculum; support for the project.
2. **Implementation**: Effectiveness of implementation; successes; challenges; lessons learned.
3. **Short-term outcomes**: Extent to which the project is meeting its goals; alignment to Workforce Development System; extent to which the project is addressing the pathways; increases in expanding the number of candidates for employment in the sector.

Meetings that involved both the internal (Grant Management team) and external evaluation teams, including those that specifically focus on evaluation and observations of regular AWESM meetings, were instrumental components of the evaluation approach.

Background

According to the North Carolina Department of Commerce (NC-Commerce), manufacturing accounted for about 100,000 jobs in the 12-county Piedmont region in 2020, with a concentration of manufacturing jobs that was about 66% higher than the national average before the COVID-19 pandemic. While July 2020 data showed unemployment at 9.4% (NC-Commerce), economic recovery in the state and nationally was projected to bring 1,200 jobs to the region over five years in plastics and rubber products, transportation equipment, machinery, and fabricated metal product manufacturing.

When the grant was written for the project, the region consisted of more than 275 manufacturing-related registered apprenticeship programs in which employers support technical and general education while employing students. The high number of opportunities available was evidence of the ongoing demand for skilled workers. However, gaps in the education-workforce system were apparent, particularly in the wake of the COVID-19 pandemic. First, there was no structured process to assess the skills and experience of unemployed

workers and award college CPL. Nor was there a common practice for articulating workforce training to college credit. Second, there was no common language for colleges and manufacturing-sector employers to describe core KSAs needed from training, a key element in creating a structured process to assess skills and prior learning. These two gaps indicated that the regional education-workforce system was fragmented, with a lack of alignment and coordination between employers and colleges to create more accessible career pathways and strengthen the talent pipeline.

Awarded in 2021 to Forsyth Technical Community College, the AWESM Consortium grant was designed to make systems-change enhancements to education and occupational training for machinists, industrial machinery mechanics, and welders with the aim of increasing the number of workers regionally for these positions. The Consortium was comprised of eight community colleges in North Carolina (Figure 2), including Alamance Community College (ACC), Davidson-Davie Community College (DDCC), Forsyth Technical Community College (FTCC), Guilford Technical Community College (GTCC), Montgomery Community College (MCC), Randolph Community College (RCC), Rockingham Community College (RKCC), and Surry Community College (SCC).

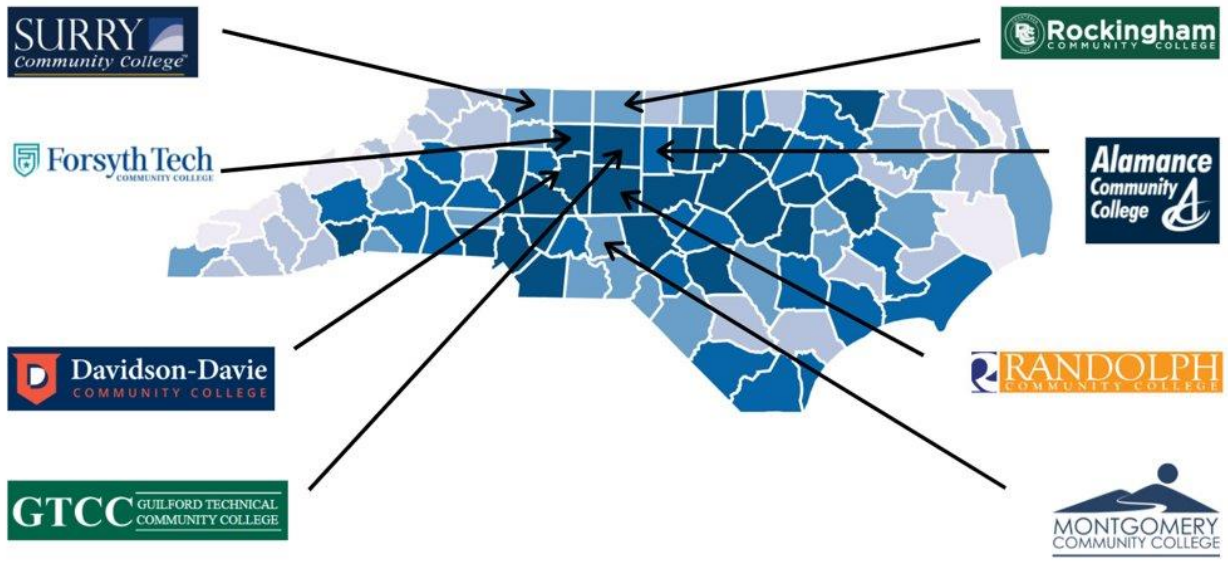


Figure 2. Map of consortium partners.

Key partners' active participation was essential for the success of the AWESM project, as their guidance helped align workforce needs with educational programs. These partners are shown in Table 1.

Workforce Development Boards	• Piedmont Triad Regional Council (PTRC) • Guilford Works Regional Partnership Workforce Development Board	
Employers	• RegO Products • CPM Wolverine Proctor	• Johnson CNC • Jordan Lumber

	• Egger • Kurz • Mohawk Industries, Inc. • Siemens • TE Connectivity • DaVinci Aerospace • Orano • Carolina Dairy	• Carolina Aseptic • Elastic Therapy • Jowat Corporation • Barrier1TM Systems • Machine Specialties, Inc – MSI • UNIFI • Jordan Innovative Fabrication • CID, Inc.

Table 1. Partners providing input and guidance on the Forsyth project.

The AWESM project targeted student populations within the fields of machining, industrial systems technology, welding, and mechatronics. Students included community college students, incumbent workers, and underemployed workers.

The project aimed to accomplish its overarching goal by addressing critical areas identified in a gap analysis through the following activities as shown in Figure 3: 1) adopt the BILT model 2) establish a common language for KSAs, 3) Expand CPL and 4) establish competency-based and digital badging. As a result, this project will reduce fragmentation in the education-workforce system.

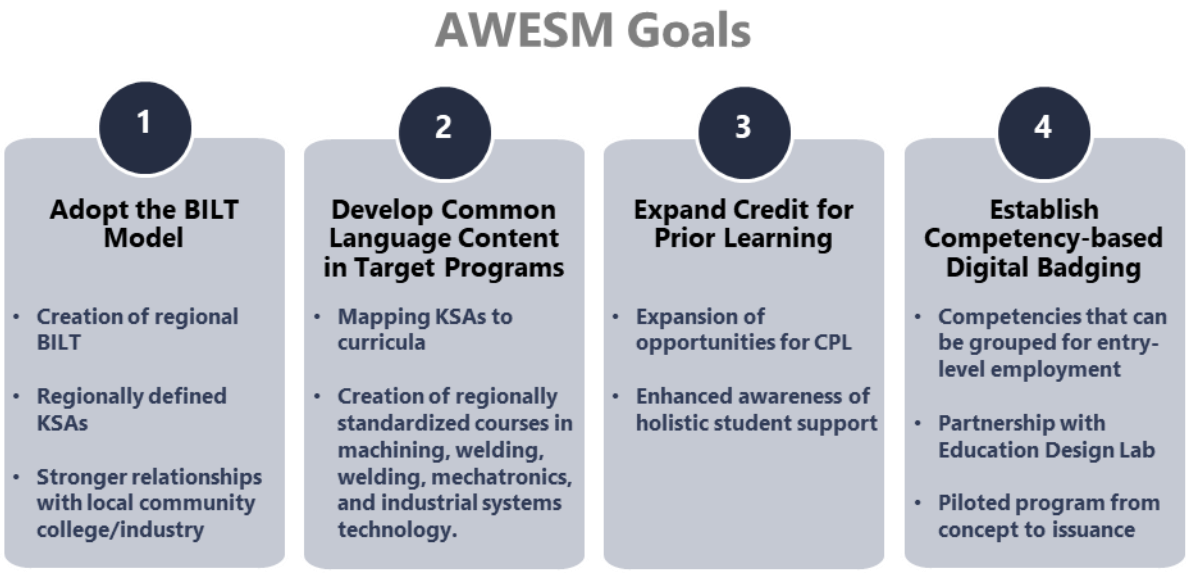


Figure 3. AWESM goals and activities

This final evaluation report provides a comprehensive overview of project accomplishments through the third quarter of the final year of the project, a summary of key evaluation findings, an analysis of challenges encountered, and recommendations for sustaining and building upon these efforts. As the funding period concludes, this report also outlines strategies for leveraging the progress achieved to date to ensure the project's full potential is realized.

METHODS AND ANALYSIS

Evaluation Questions

The overall objective of the evaluation was to capture and provide timely information to the project team to help them: ensure that activities and strategies were implemented effectively and that improvement opportunities were identified and leveraged (implementation evaluation), ensure that the activities and strategies of the project were being implemented in a way that addressed the needs of stakeholders (developmental evaluation); and assess the short-term outcomes of the grant (short-term outcomes evaluation).

Implementation evaluation questions

- How effectively are activities and strategies being implemented?
- What is working well? What opportunities have emerged?
- What actions have been effective in addressing challenges? What – if any – actions have been ineffective?

Developmental evaluation questions

- How satisfied are instructors and students with the current state of the various aspects being targeted by the project at their schools? Aspects include, but are not limited to, the following:
  - The use of educational technology
  - Credit for Prior Learning practices and policies
  - Academic support services for students, including tutoring and academic advising. [students only]
  - Non-academic support services for students, including basic needs, financial counseling, and mental health. [students only]
- What are the training/educational needs for instructors in terms of adopting and using educational technology in their classrooms?
- How satisfied are instructors and employers regarding the project's activities and strategies related to the identification and development of common KSAs mapped to curricula?
- How satisfied are students with the activities and strategies related to the identification and development of common KSAs mapped to curricula?

Short-term outcomes evaluation questions

- To what extent is the project team meeting its outcomes goals? Outcomes include the following:
  - Employer participation in Business & Industry Leadership Teams (BILTs)
  - The development of common KSAs
  - The alignment of educational programs with sector needs
  - The number of employers using digital badging for recruitment and hiring
  - The number of participants earning digital badges
  - The number of participants receiving CPL credit
  - The number of colleges jointly enrolling students into synchronous & asynchronous courses with local labs

  - The number of students who receive student support services and the number of Workforce Innovation and Opportunity Act (WIOA) enrolled candidates in manufacturing programs.
- To what extent are the project's activities and strategies aligned with the Workforce Development System?
- To what extent are the activities and strategies improving the feasibility, speed, and cost of acquiring the credentials needed for a desired job in machining, mechatronics/industrial systems technology, and welding?

Evaluation Design

The developmental and implementation evaluations were descriptive and formative. Data were obtained through reviews of project-level documents (e.g., meeting notes) and through annual and other periodic cross-sectional surveys and interviews with students, instructors, and employers. These activities helped the evaluation and project teams to identify needs, assess the quality of implementation efforts, and capture evidence of attitudinal and behavioral support for the project's activities and strategies.

The short-term outcomes evaluation had a descriptive component that included a comparison of actual quantitative outcomes (e.g., number and types of credentials obtained) with the goals for each outcome. The outcomes evaluation also included an inferential component using a pre-post single group design to answer the outcomes-related question regarding the extent to which activities and strategies are improving the feasibility of acquiring the credentials needed.

Sampling Strategy & Participant Number

The populations of interest for the evaluation included regional employers who hire employees in the targeted field, instructors from the eight participating consortium schools who are teaching courses in the targeted areas, and students at the eight consortium schools who are taking courses in the targeted areas. Given the feasibility of reaching each member of these populations, data collection efforts included a full census rather than sampling within the populations. In other words, all members of these populations were invited to respond to surveys or participate in interviews pertinent to their population. As with any approach to gathering data from a population, some error is expected with both unit (i.e., individual) and item-nonresponse. The project team took steps to maximize individual response rates through strategies including invitations that state the purpose and use of the surveys clearly, tracking non-responses, and sending email reminders. Item-nonresponse was minimized by ensuring that surveys were well-designed and as brief as possible. Some items were designed to require a response, but that option was used sparingly to minimize respondent frustration.

Data Collection & Data Sources

This section describes the various sources of data and measures that were used to collect data for developmental, implementation, and outcomes evaluation.

Project level documents

Project-generated documents, such as meeting notes, BILT meeting notes, conversations with the project team, recruiting and marketing materials, and other documents indicative of the implementation process, were reviewed on an ongoing basis to address the research questions.

Institutional and Organizational Data

Quantitative data, such as the number of enrolled students and the number and types of credentials obtained, were requested from partnering colleges. Targeted data were incorporated, collected, and compiled into a data spreadsheet for ongoing monitoring of project implementation.

Surveys

A variety of surveys were disseminated throughout the lifetime of the project to elicit feedback from stakeholders, like students and BILT members, regarding:

- Perceptions of experiences using holistic support services
- Suggestions for improvements for activities in which they participate, like holistic support services

Surveys were developed through an iterative process that included reviews and feedback from the Forsyth project team and Consortium site leads when appropriate. Reviewers were asked to identify and address issues that might undermine validity, including question clarity, response option appropriateness, and ease of completion. Surveys were then pretested using the Question Appraisal System (Gordon & Lessler,1999) as a framework to identify and address any remaining problems that might undermine the validity of the survey data.

Focus Groups and Interviews

Discussions with stakeholder groups, including individuals involved in the planning and implementation of this grant, intake coaches, success coaches, and BILT members, were held to gather qualitative data related to the evaluation or other emergent questions. Focus group and interview protocols were also developed through an iterative process that included reviews and feedback with input from the Forsyth project team to ensure that the desired information was captured.

Operational Approach

Instrumental in the planning and improvement processes were a variety of meetings that involved the internal and external evaluation teams to varying degrees. Additionally, the types of meetings and their purposes dictated the frequency of these meetings throughout the project. A description of each meeting and its frequency is provided below.

Project Meetings and Targeted Discussions

Periodic meetings between the external evaluation and Forsyth project teams, quarterly meetings with the larger Consortium partners, and *ad hoc* focused discussions regarding evaluation provided ample opportunities to discuss general project updates and provide just-in-time feedback for the continuous improvement and developmental processes.

The Rucks Group External Evaluation Team Regular Meetings

The external evaluation and project teams meet regularly to obtain project updates, plan for upcoming evaluation needs, and review evaluation instruments. These meetings occurred weekly for the first few months of project initiation and continued bi-weekly, then monthly, and as needed as the project progressed.

Analysis Strategies & Procedures

Quantitative data gathered through documents, records, surveys, and interviews were analyzed with descriptive statistics, which provided informative summaries of outcomes data, including frequencies (e.g., counts), central tendencies (e.g., means), and variation (e.g., cross-tabulations or standard deviations). Quantitative analyses were conducted using the statistical software package SPSS.

Qualitative or open-response data from surveys and interviews was thematically analyzed and coded to identify common topics, ideas, and patterns. The analyses will first be conducted independently by two or three of the members of the evaluation team, who then worked together to come to a consensus on the thematic codes. The results from the thematic analyses are reported in a summary descriptive format showing coding frequencies and – in some cases – crosstabulations of frequencies by group (e.g., educational institution). The project team was also provided with the full set of coded text for reference.

PROGRAM OVERVIEW

As previously referenced, the AWESM project is guided by the theory of change, which posits that the project's activities will lead to a more coherent, less fragmented education-workforce development system that will ensure a match between workers' skills and employers' expectations resulting in an increased number of adults with well-paying jobs. As such, the AWESM project engaged in the following activities:

1. Create a Business & Industry Leadership Team (BILT), giving regional employers a co-leadership role for technical programs in machining, industrial systems technology, welding, and mechatronics.
2. Introduce digital badges mapping BILT-defined KSAs to student-demonstrated competencies.
3. Use BILT-defined KSAs as the foundation for articulating workforce training into college credit in machining, industrial systems technology, welding, and mechatronics; and
4. Regionalize Credit for Prior Learning (CPL) and use digital badging when awarding students credit for their prior learning and experience.

The purpose of developing a common language (i.e., identifying KSAs) among colleges and manufacturing-sector employers was to describe the core knowledge and KSAs needed through training to obtain jobs in machining, mechatronics, industrial systems technology, and welding. The project team believed that incorporating competency-based digital badging would facilitate structured CPL and align accelerated learning pathways with employer-validated work readiness standards and discrete competencies.

These project activities also align with four of the four core elements outlined by the DOL SCC solicitation:

1. Sector strategies and employer engagement.
2. Enhanced career pathway programs and accelerated learning strategies.
3. Strategic alignment with the Workforce Development System; and
4. Systems change/accelerated learning strategies

To support these activities, the AWESM project was structured with a few main components:

- A BILT that was co-led by industry and education partners, which oversees the general development of KSAs for programs.
- Forsyth Tech (Grant Management team) as the lead institution to provide project leadership and manages grants and reporting, as well as actively engages in consortium member responsibilities; and
- Consortium colleges that participated in the BILT incorporated regionalized prior learning standards, co-developed joint training modules, and provided support to students in the various programs targeted by the AWESM, as shown in Table 2.

	Institution							
Target Programs	ACC	DDCC	FTCC	GCC	MCC	RCC	RKCC	SCC
Computer Integrated Machining	x	x	x			x	x	
Electrical Systems Technology						x		
Electronics Engineering Technology		x						
Industrial Systems Technology		x			x	x	x	
Machining Technology				x				x
Manufacturing Technology				x		x		
Mechatronics	x		x					x
Mechatronics Engineering Technology				x				
Mechatronics Industrial Systems Technology	x							
Welding Technology	x	x	x	x	x	x	x	x

Table 2. Overview of institutions and programs in AWESM.

In addition to the engagement of entities as previously described, this report highlights several key vendors that were critical to the implementation of the AWESM project. A brief description of each vendor's role and contributions to the project is provided below.

- Odigia[2]: An online educational platform to house newly created content for standardized courses that are available for all consortium partners, developed by SMEs and the AWESM Curriculum Coordinator.
- ToolingU: A software platform used to provide educational tools and supplemental content for students within these programs.
- Credential Engine: Support to assess and develop greater access to credential data across the region

[2] https://www.odigia.com/

- Education Design Lab: Assisted with the creation and implementation of micro-credential pathways addressing critical workforce skills. Over the course of the partnership, they assisted with the identification of 54 micro-credentials across machining, welding, mechatronics, and industrial systems technology, gaining industry endorsement and uploading the credentials to Credly.
- Shawn Meck: Industry consultant for the BILT sessions.
- The Rucks Group: The third-party evaluation team hired to evaluate the AWESM project.

SUMMARY OF ACTIVITIES AND OUTPUTS

Part of the short-term outcomes evaluation phase focused on capturing evidence regarding the extent to which the Grant Management team is meeting its customized outcomes goals related to the project's activities and strategies (e.g., the number of employers in the region active in the BILT for advanced manufacturing).

Table 3 provides a summary of the AWESM project's progress on their customized outcomes goals. Through September 30, 2024, the AWESM project made substantial progress toward its customized outcome goals, achieving significant milestones in several areas. The project exceeded its target of engaging 50 employers in the BILT for Advanced Manufacturing, with 118 employers actively participating (236% of the goal). However, progress has yet to be reported on incorporating digital badging into job descriptions, where the goal was 25 employers. In terms of community college partnerships, the project met its objective of enrolling students in asynchronous and synchronous courses with flexible scheduling at eight institutions. Additionally, 59 digital badges mapped to BILT-defined KSAs were introduced, achieving 86% of the target of 70 badges.

The project also demonstrated remarkable success in workforce development and ecosystem growth. It far surpassed the goal of increasing WIOA-enrolled candidates in advanced manufacturing programs, enrolling 523 candidates compared to the target of 74, achieving 707% of the goal. The number of public and private entities in the regional education-workforce ecosystem providing holistic student support reached 356, significantly exceeding the target of 25 (1,424% of the goal).

In terms of college CPL, 51 students earned CPL during the grant period, exceeding the target of 48 students (106%), while 222 CPL credits were awarded, surpassing the goal of 177 credits (125%). Progress in digital badging utilization includes the design of 59 badges (84% of the target of 70) and the awarding of 710 individual badges (62% of the target of 1,150). The remainder of this section provides a more detailed picture of the team's progress toward the customized outcomes goals over the course of the project.

Customized Outcome	Target	Total (as of 09/30/24)
2a. Increase the number of employers in the region that are active in the BILT for advanced manufacturing	50	118
2b. Increase the number of sector employers incorporating digital badging in job descriptions as a preference in employee recruitment and hiring.	25	0
3a. Increase the number of community colleges jointly enrolling students into asynchronous and synchronous courses with flexible	8	8

scheduling for adult workers and others to complete technical instruction remotely and hands-on activities locally.		
3b. Introduce digital badging that maps to BILT-defined KSAs	70	59
4a. Achieve year-over-year percentage increases in the number of WIOA-enrollment candidates in machining, mechatronics, welding, or related programs of study enhanced through the project.	74	523
4b. Increase the number of public and private entities from zero to 25 in the regional education-workforce ecosystem that provides holistic support for students and trainees along the certified career pathway for advanced manufacturing.	25	356
5a. Achieve year-over-year increases in the number of participants who attain college CPL and/or the number of college credits attained by students for prior learning.	48 students 177 CPL credits	51 students 222 CPL credits
5b. Increase the use of digital badges to align the education-workforce system and provide links for job seekers and incumbent workers who can move seamlessly at their own pace along regional career pathways in manufacturing.	70 badges designed 1150 individual badges awarded	59 badges available 710 individual badges awarded

Table 3. Summary of AWESM project's progress on their customized outcomes goals

Core Element: Sector Strategies & Employer Engagement

Engaging actively with employers is crucial for developing curricula that align with industry needs. The goal for the Forsyth project was to recruit 38 additional active employers, bringing the total to 50 by the end of the grant period. Active involvement was defined as a BILT-member company that attends at least 60% of scheduled meetings in any 12-month period and submits KSA input that reflects its organization's needs. The project team achieved and surpassed its grant goal of 50 active employer partners. Through September 30, 2024, 118 employer partners were actively involved with the project team's efforts, particularly through involvement in BILT sessions.

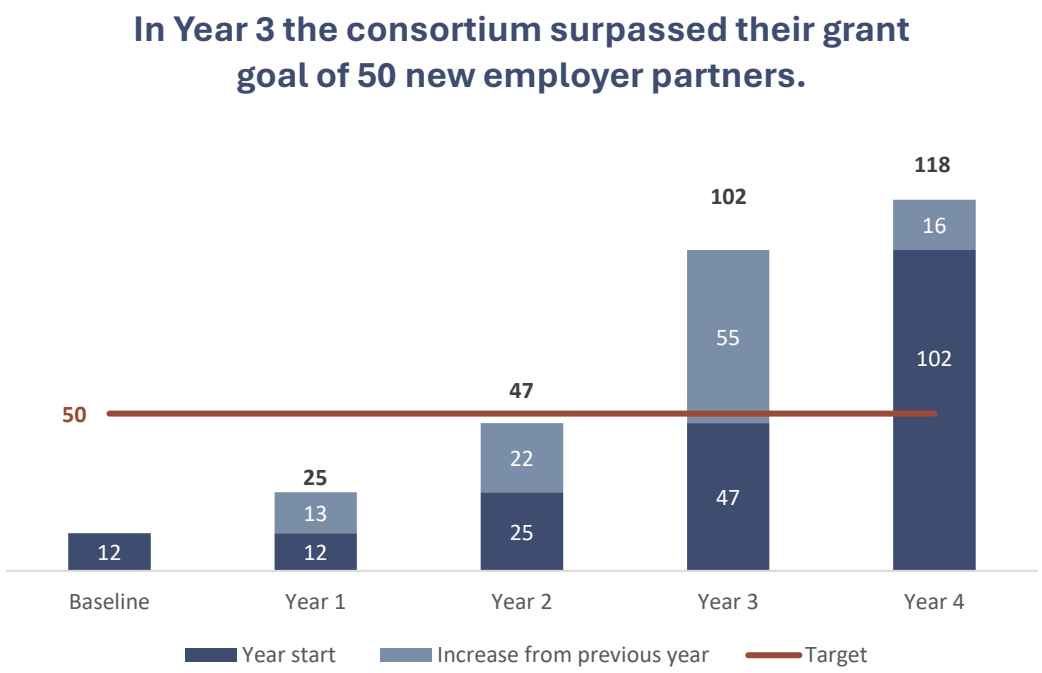


Figure 4. Consortium employer partners across all grant years.

Core Element: Enhanced Career Pathways Programs & Accelerated Learning Strategies

The Grant Management team aimed to increase the number of participants who attain college CPL by 20% year over year and the number of college credits awarded for prior learning by the same percentage. The goal was to have 39 students earn college CPL during the grant period, bringing the total to 48 (including nine awarded at baseline). Additionally, the aim was to award 144 college CPL credits during the grant, reaching a total of 177 (including 33 baseline). By the end of Quarter 3 in Year 4, 60 students had earned CPL, exceeding the target of 48. Furthermore, 222 additional CPL credits were awarded, resulting in a total of 255, significantly surpassing the goal of 177.

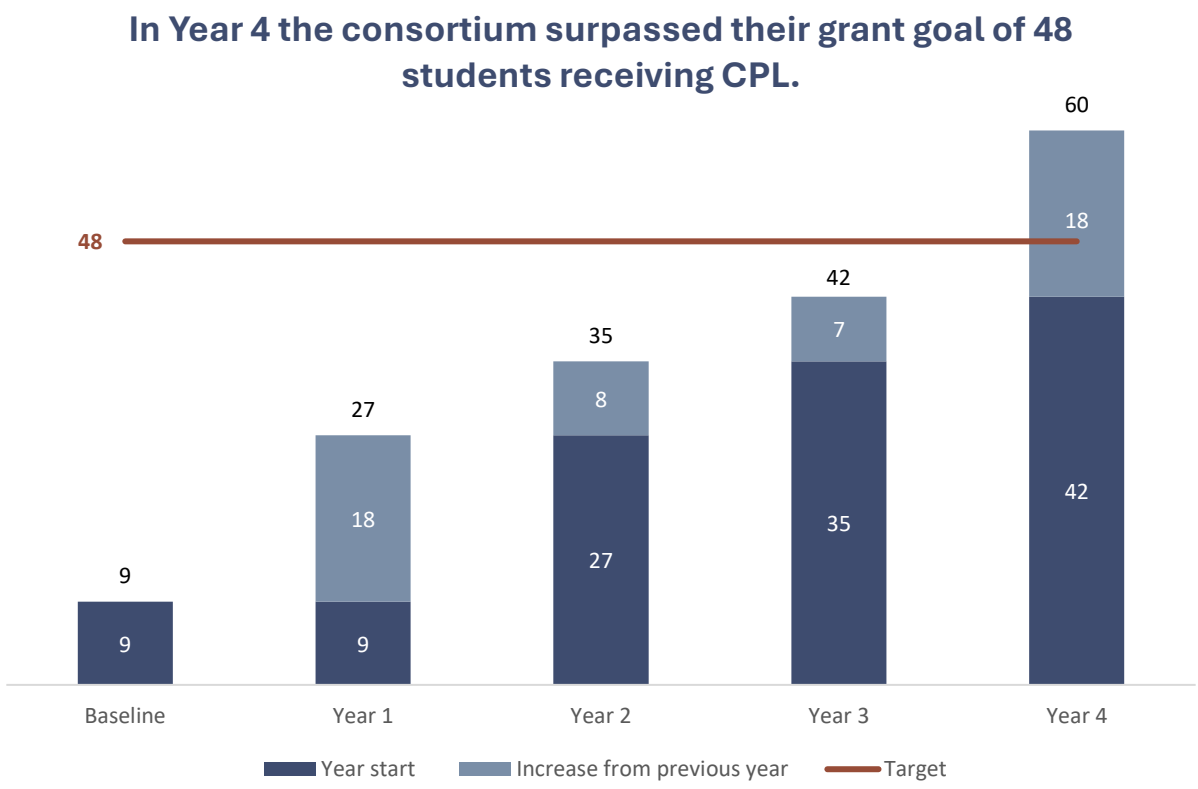


Figure 5. Students receiving CPL across all grant years.

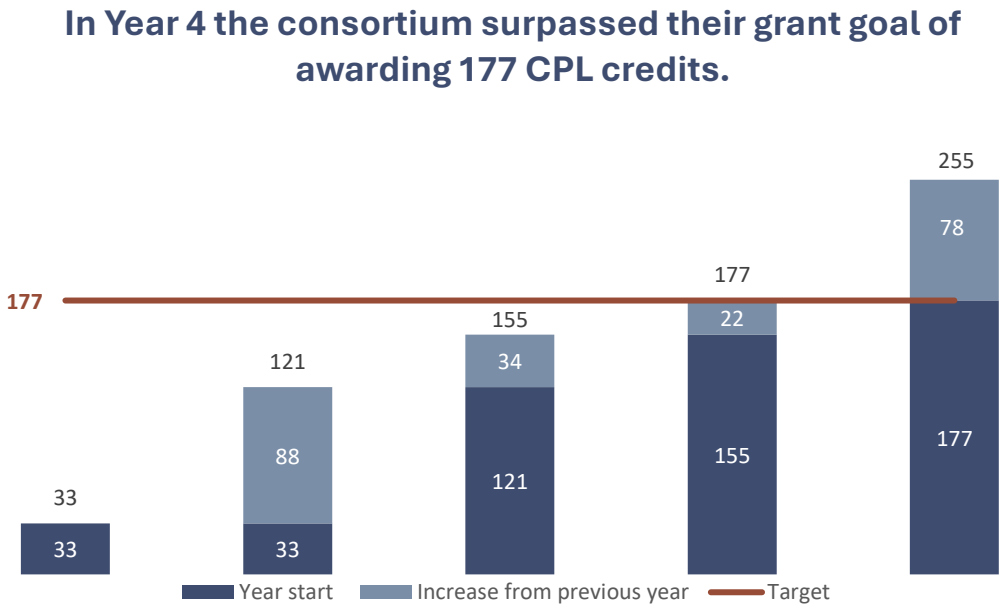


Figure 6. CPL credits awarded across all grant years.

Core Element: Strategic Alignment to Workforce Development Systems

WIOA Enrollment and Engagement

Students face non-academic challenges, such as financial constraints and childcare, which can impact their ability to achieve their educational goals. Consequently, it is important for the Grant Management team to leverage the resources provided through state-funded programs such as WIOA and to encourage and support access to public and private holistic services (e.g., daycare support) for students and trainees who want to earn credentials and obtain better jobs. The team aimed for a 10% increase in WIOA-enrolled candidates in machining, mechatronics, welding, or related programs, with an overall target of 74 WIOA-enrolled students over four years (Customized Outcome 4a). Figure 7 depicts the consortium's success in surpassing its grant goal of enrolling 74 WIOA participants. Starting with 16 participants at the baseline, the project achieved steady growth over four years. By Year 1, the total rose to 49 participants, with an increase of 33 from the baseline. In Year 2, an additional 39 participants were added, bringing the total to 88. Significant progress was made in Year 3, with 378 more participants enrolled for a total of 466. By Year 4, the consortium added 73 more participants, culminating in 539 participants—far exceeding the original target of 74.

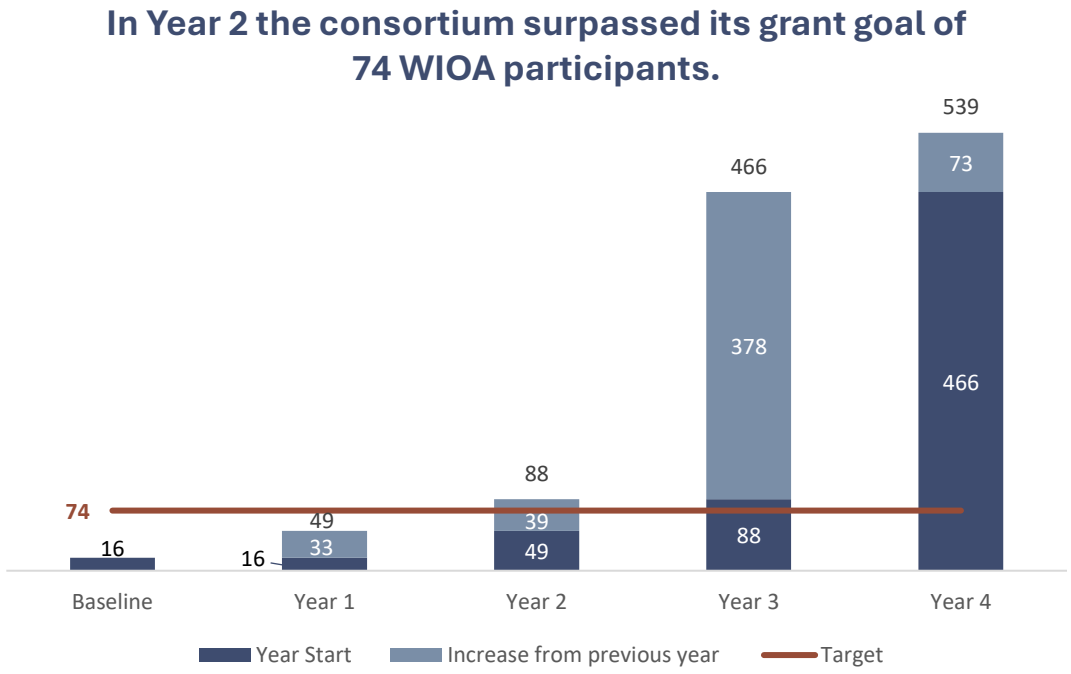


Figure 7. WIOA participants across all grant years.

Holistic Student Support

The Grant Management team aimed to increase the number of public and private entities providing holistic support for students and trainees along the certified career pathway for advanced manufacturing across eight consortium colleges from zero to 25 over four years. Holistic support includes academic and non-academic assistance, such as tutoring, transportation, childcare, and food insecurity aid. Figure 8 shows the consortium's progress in surpassing its grant goal of engaging 25 public and private entities to provide holistic student

support. The consortium reached its target by the end of Year 1 with 25 entities. In Year 2, the project experienced significant growth, adding 290 new entities for a total of 315, far exceeding the original goal. This upward trajectory continued in Year 3, with an additional 39 entities joining, bringing the total to 354. By Year 4, two more entities were added, culminating in 356 entities providing holistic support.

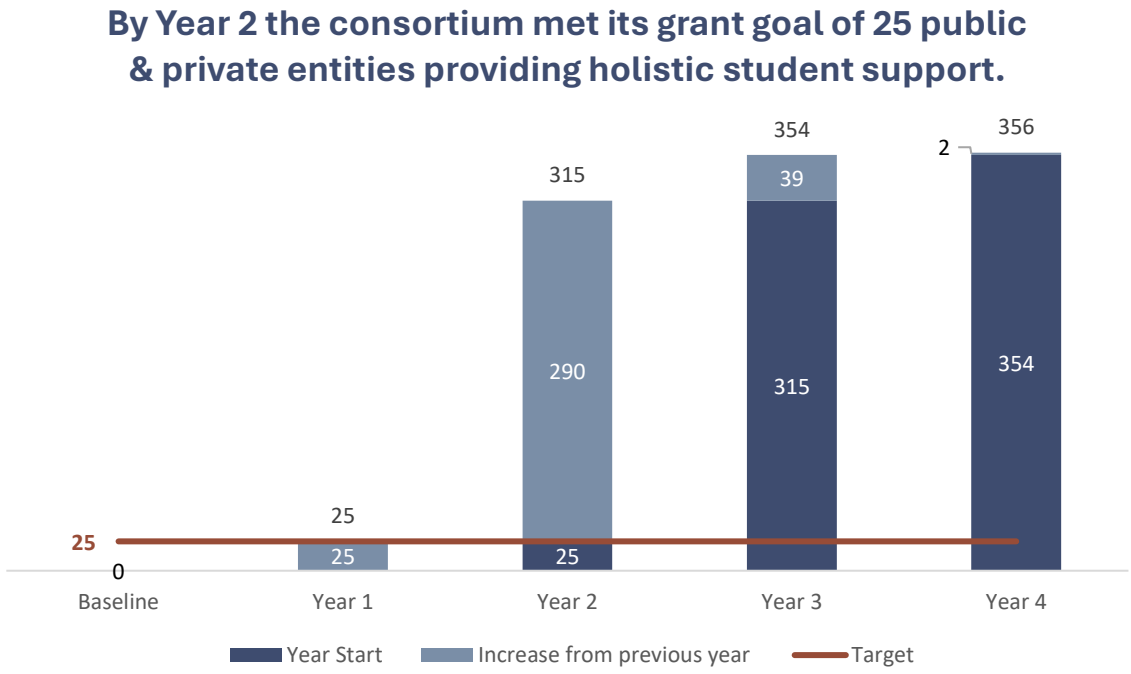


Figure 8. Public and private holistic student support across all grant years.

Core Element: Systems Change/Accelerated Learning Pathways

Badges

Fifty-nine of the targeted 70 (84%) distinct badges based on BILT-defined KSAs were to students by Q3 2024 (as shown in Figure 9), with much of the progress concentrated in later quarters. This achievement highlights the success of the collaborative efforts between AWESM and employer partners in aligning the job-ready skills needed in machining, welding, mechatronics, and IST with existing badges while guiding the creation of new badges for students.

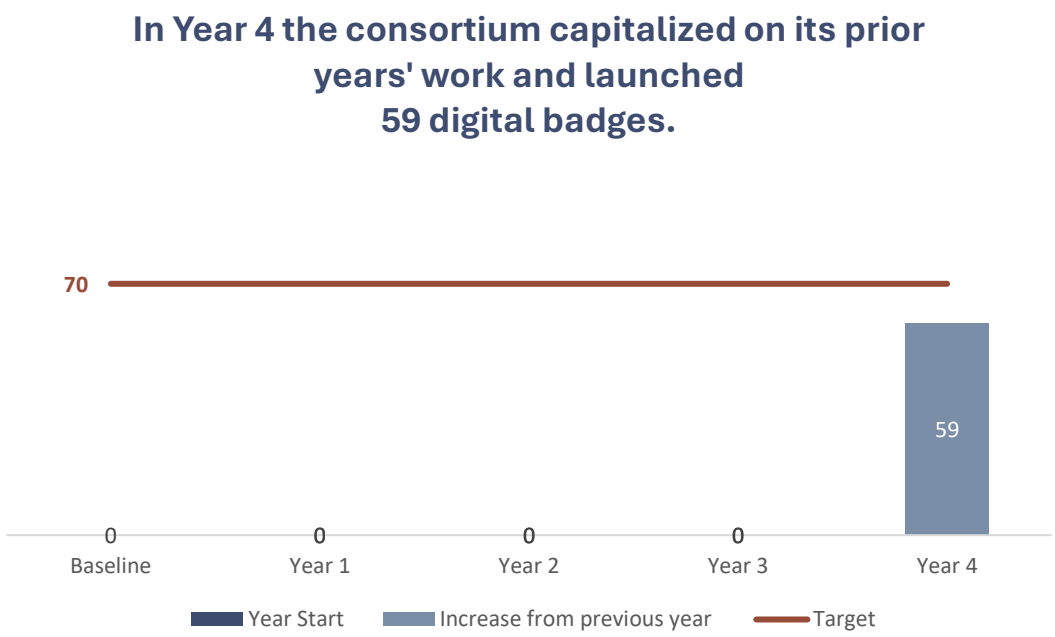


Figure 9. Digital badges established across all grant years.

Figure 10 shows that badge issuance for students has reached only 710 or 62% of the goal to distribute 1,150 badges by the end of the funding period, all of which were the already developed industry-recognized badges that align with the industry-identified KSAs. The delays already described prevented the team from being able to launch and start issuing the 54 consortium-sponsored badges in time to meet this goal. A list of the industry-recognized badges and the number of students earning each is provided in Appendix D. A list of the 54 consortium-sponsored badges that have been developed is provided in Appendix E.

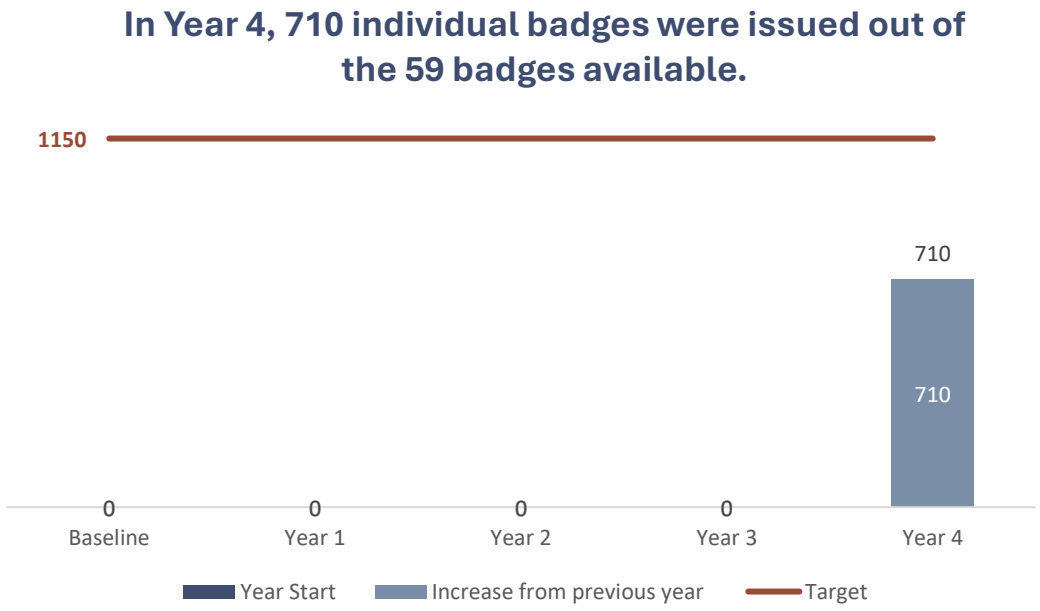


Figure 10. Individual badges issued across all grant years.

FINDINGS

The following section presents summative findings on four core elements of AWESM:

1. Sector Strategies and Employer Engagement
2. Enhanced Career Pathways Programs & Accelerated Learning Strategies
3. Strategic Alignment to Workforce Development Systems
4. Systems Change and Accelerated Learning Pathways

Core Element: Sector Strategies & Employer Engagement

The project team leveraged the Business and Industry Leadership Team (BILT) [3] model to engage with employers to ensure that educational and curricular improvements were aligned with industry needs. The BILT model provides a process for connecting community colleges and industry leaders to provide the businesses that hire students with a voice in defining the KSAs they need in the workforce. The purpose of the BILT is to discuss and vote on KSAs so that the colleges can begin the mapping process to their curricula and develop courses and digital badges.

Implementation Evaluation

Implementation Evaluation Questions Related to Employer Engagement:

- How effectively are activities and strategies being implemented?
- What is working well? What challenges/barriers have emerged?
- What actions have been effective in addressing challenges? What – if any – actions have been effective?

Worked Well – Employer Engagement

A key goal of the consortium was to align a fragmented education-workforce system by establishing a common language for colleges and manufacturing-sector employers to describe core KSAs needed from training. Due to the time commitment to the KSA process, the Grant Management team decided to focus on one sector at a time, starting with machining in 2021 and ending with industrial systems technology (IST) in 2024 as shown in Figure 11.

[3] https://www.pathwaystoinnovation.org/bilt-model-overview/

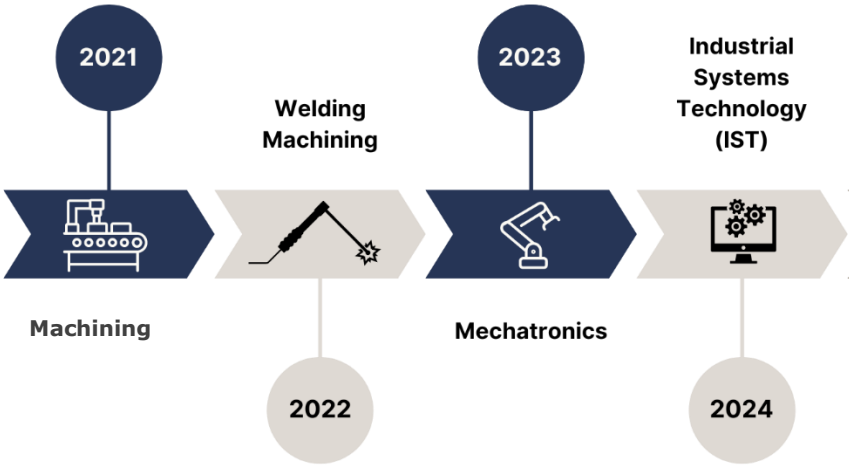


Figure 11. KSAs were developed one field at a time each year.

The BILT component of AWESM provided an effective platform for consistent and ongoing collaboration between educational institutions and industry leaders, ensuring curricula were aligned with industry workforce needs. In Years 1 and 2, the foundation for the BILT was laid by forming both local and regional BILT groups across consortium colleges, creating a strong initial network. This structure allowed industry partners to contribute to defining KSAs in each of the targeted program areas. By Year 3, BILT became a well-integrated and well-received process for identifying and revising KSAs and helping AWESM consistently adapt the curriculum to meet changing industry standards. Industry partners provided regular feedback, enhancing program relevance, and ensuring that students were prepared with the skills necessary for immediate employment. By Year 4, the project team surpassed its employer recruitment target of 50 regional employers and continued to attract new industry partners throughout the project's final year. The establishment of four BILTs and co-creation of KSAs for four manufacturing sector digital badges (i.e., machining, welding, mechatronics, and IST) reflected the consortium's strong engagement with industry partners and the effective implementation of employer engagement strategies.

Challenges – Employer Engagement

Though the consortium experienced great success in implementing the BILT model, it was not without challenges. Early challenges included inconsistent attendance and limited engagement from some industry partners. The initial lack of a centralized coordinator resulted in fragmented participation, which slowed progress on KSA updates and curriculum alignment. Additionally, industry leaders were initially hesitant about digital badging and were unsure of its value as a credentialing tool. This skepticism stemmed from unfamiliarity with digital credentials and the challenge of seeing them as equal to traditional certifications. Over time, frequent turnover within partner organizations further disrupted continuity, making it difficult to maintain strong, consistent relationships with BILT members.

Solutions– Employer Engagement

To address challenges with employer attendance, AWESM implemented a virtual option for BILT meetings, significantly improving participation rates. By administering surveys during meetings instead of afterward,

AWESM captured more immediate feedback. A newly appointed Business Liaison in Year 3 further stabilized participation by coordinating consistent communication with employers and ensuring engagement with project objectives, including the role of digital badges. A tracking spreadsheet was developed to monitor employer engagement, highlighting areas needing targeted outreach and supporting the integration of digital badges into job descriptions.

Developmental Evaluation – Employer Engagement

Developmental evaluation questions related to employer engagement:

- How satisfied are employers regarding the project's activities and strategies related to the identification and development of common KSAs mapped to curricula?
- To what extent are employers expressing attitudes and engaging in behaviors that demonstrate support for the project's activities and strategies?

The success of the AWESM project was dependent upon the continued support and active involvement of partnering employers. In addition to tracking the number of industry partners actively involved in the BILT process, data was also gathered to gauge the extent to which employers were satisfied with the activities and processes used to identify KSAs.

Surveys were administered to employers after each introductory and voting BILT sessions. The two BILT session surveys aimed to gather participant feedback on session effectiveness, personal benefits gained, and specific needs. Both surveys included questions about the overall effectiveness of the sessions, allowing participants to share suggestions for improvement. They also explored whether participants gained any insights or other personal benefits from their participation. The voting session survey also included questions to assess satisfaction with the final outcomes, such as the compiled lists of KSAs, to gauge participant approval of tangible results. While both surveys shared a core focus on effectiveness and impact, the voting session uniquely sought feedback on outcome satisfaction, adding depth to the evaluation. Copies of these surveys are provided in Appendix C.

The overall results in response to the question, "In your view, how effective was this session?" indicated that a substantial percentage of employers found the BILT sessions to be "Very effective," with most sessions having over 75% of participants selecting this response. Notably, the May 2022 Welding Intro and March 2024 Industrial Systems Tech Voting sessions achieved a perfect score, with 100% of respondents rating them as "Very effective." This high level of approval suggests that the BILT sessions are generally successful in delivering value and meeting employer expectations.

There are some differences between session types and fields. Introductory sessions have higher percentages of "Very effective" ratings compared to voting sessions, which may indicate that participants value the initial orientation and information-sharing more than decision-making aspects in later sessions (Figure 12). Additionally, there is variation across fields; for example, while 100% of respondents found the Welding Intro session very effective, only 68% felt the same about its Voting session. In contrast, Mechatronics sessions remained consistently high in both types.

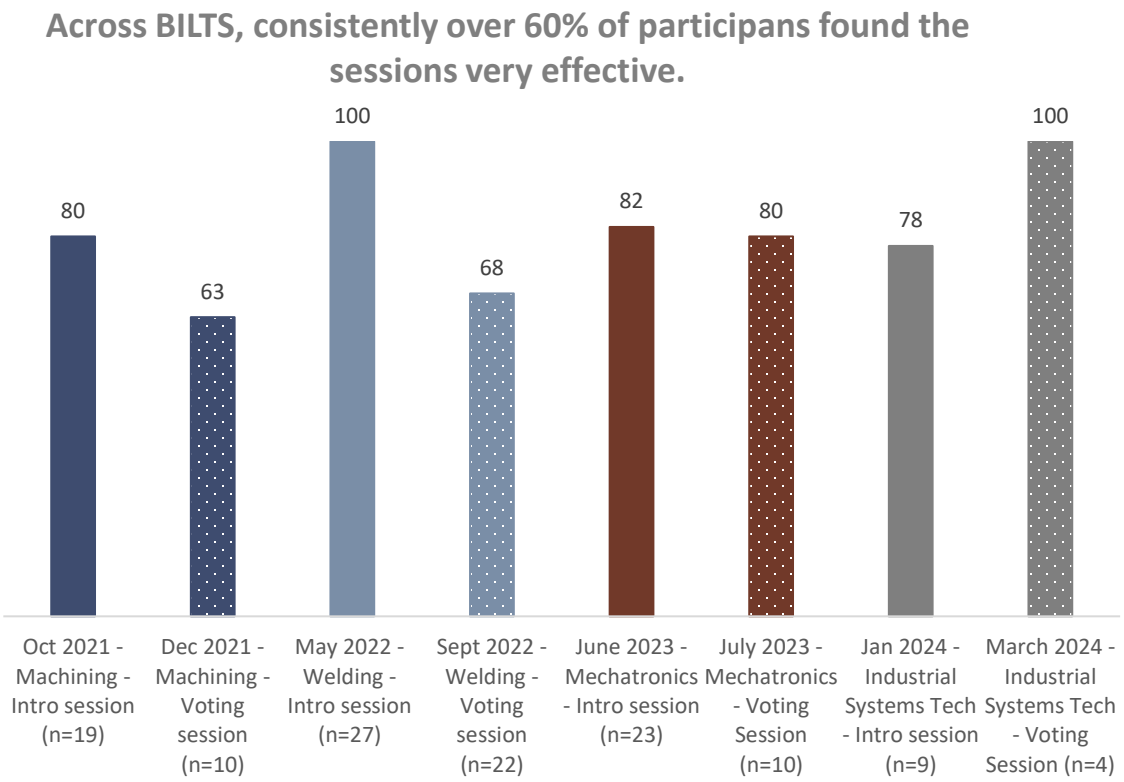


Figure 12. Percentage of employers who selected "Very effective" in responses to the question, *"In your view, how effective was this session?"*

As a follow-up question, employers were also asked to describe what would have made the sessions more effective. Feedback from the earlier BILT sessions regarding what would have made the sessions more effective indicated a desire for more structured materials and preparation prior to the meetings. Several participants had suggested providing digital agendas, early access to slides, pre-read materials, and handouts to enhance their understanding and participation. Some responses emphasized the need for clearer explanations of the processes, more detailed pre-meeting information, and a better delineation between regional and local BILT topics. There was also a call for more industry participation and interaction, with suggestions to focus on networking opportunities and ensuring more businesses were represented. Overall, while the sessions were seen as effective, participants felt that clearer organization and additional materials could have improved the experience and outcome of the BILT sessions.

In response to employer feedback on enhancing BILT session effectiveness, the AWESM team implemented several changes aimed at creating a more structured, accessible, and interactive experience. Recognizing the need for advanced preparation, the team began distributing digital agendas, pre-read materials, and slide decks a week before each meeting, allowing participants time to review the content and prepare questions. This practice enabled more in-depth discussions during sessions, as participants arrived better informed about the topics on the agenda. Additionally, they provided handouts and structured materials during the sessions, which included detailed explanations of key processes and guidelines to clarify session objectives and roles, helping attendees follow along and participate more effectively.

To address the request for clearer distinctions between regional and local topics, the AWESM team revised their session agendas to label and separate items specific to regional BILT discussions from those pertaining to local BILT concerns. This delineation helped streamline discussions, reduced potential confusion, and allowed employers to focus on topics most relevant to their operations.

The team also increased efforts to promote networking by incorporating time specifically for industry interaction within the agenda. To encourage greater industry participation, AWESM expanded its outreach to new businesses through the High-Performance Manufacturing Association (HPMA) and other industry associations, with the goal of broadening representation and fostering a more diverse network of partners. By implementing these structured pre-session preparations and targeted outreach strategies, AWESM successfully enhanced the organization, engagement, and impact of BILT sessions, responding directly to employer feedback to create a more valuable experience for all participants and potentially greater commitment over time.

Figure 13 shows employers' responses regarding their satisfaction with the results of the BILT voting sessions. More specifically, it indicates the percentage of participants who responded "Yes" when asked, "Are you satisfied with the results (i.e., the final lists of KSAs) from this BILT session?" Satisfaction was high across sessions, with the Dec. 2021 Machining Voting session at 86%, the Sept. 2022 Welding Voting session at 80%, and both the July 2023 Mechatronics and March 2024 Industrial Systems Technology Voting sessions achieving a perfect 100%. This indicates a strong overall satisfaction with the decisions and outcomes in these sessions, suggesting that participants felt that the results aligned well with their expectations and needs in each technical field. The high satisfaction percentages highlight the effectiveness of these voting sessions in meeting employer expectations.

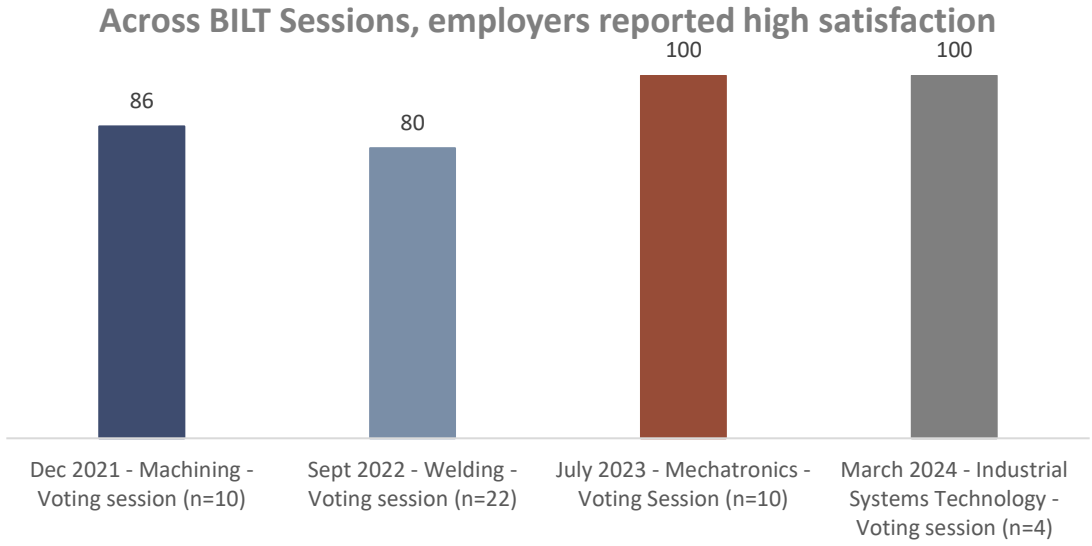


Figure 13. Percentage of individuals who selected "Yes" when asked, *"Are you satisfied with the results (i.e., the final lists of knowledge, skills, and abilities) from this BILT session?"*

In the few cases where an employer was less than satisfied, they were asked, "Could you briefly describe why you are less than satisfied with the results?" Some felt that important areas, such as the inclusion of soft skills in the core KSAs, were overlooked. Others mentioned that their institutions were already meeting industry needs and producing well-qualified workers, making the derived KSA lists seem redundant. Additionally, a few employers indicated that they were new to the process and needed more time and participation to fully engage with the KSA development.

Employers were also asked, "Did you gain any new insights from the information generated through this session?" Asking participants if they gained new insights from the information generated in a session is valuable because it helped assess the session's impact beyond immediate decision-making. Insight generation is an indicator of meaningful engagement, where participants not only contribute but also learn or perceive new industry trends, skills needs, or emerging priorities. This type of question provides feedback on the session's ability to foster professional growth, spark innovative thinking, and enhance participants' understanding of the field.

Figure 14 shows the percentage of employers who indicated they gained new insights or experienced personal benefits from participating in various BILT sessions. The May 2022 Welding Intro session, the July 2023 Mechatronics Voting session, and the March 2024 Industrial Systems Technology Voting session all saw 100% of respondents reporting new insights or benefits. Other sessions also received strong positive responses, such as the Dec. 2021 Machining Voting session (96%) and the Sept. 2022 Welding Voting session (94%). Lower but still high percentages were observed in the Oct. 2021 Machining Intro session (77%) and the January 2024 Industrial Systems Technology Intro session (78%). These results indicate that a significant portion of employers found the BILT sessions valuable for gaining insights or personal benefits, with voting sessions often yielding high levels of positive responses across different fields. This suggests that the sessions effectively provide learning opportunities and value for participating employers.

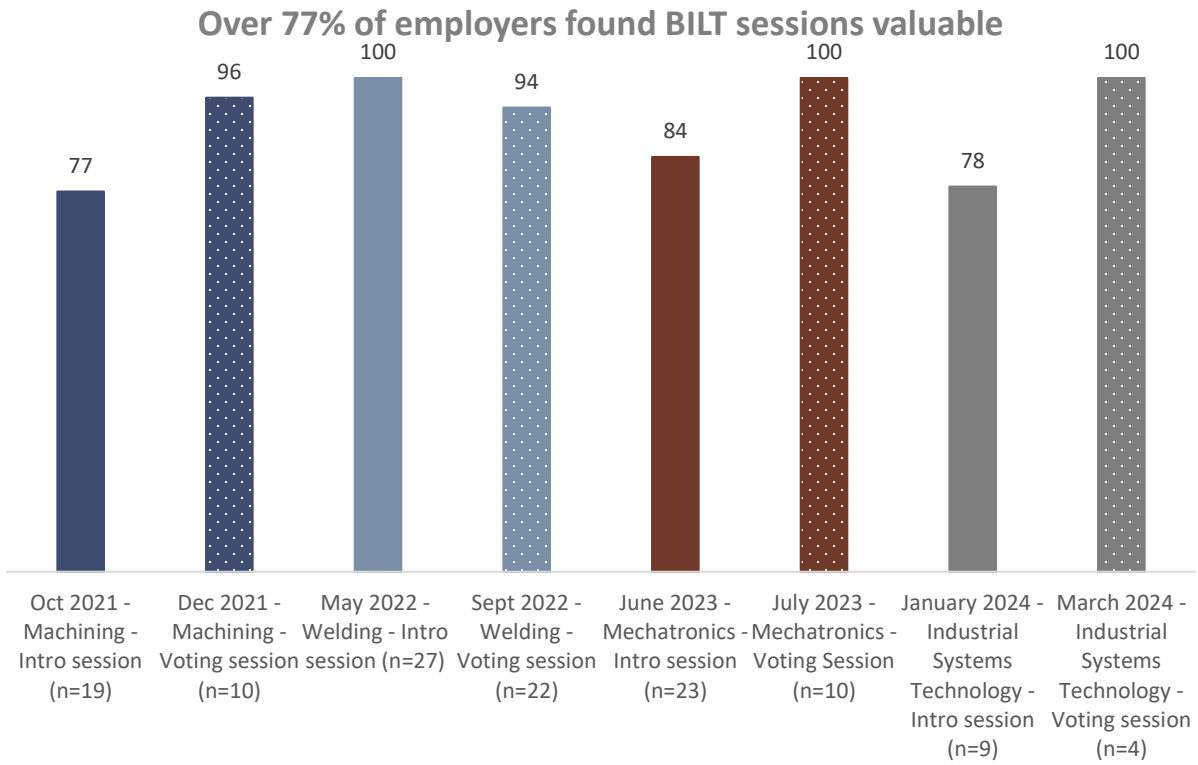


Figure 14. Percentage of individuals who selected "Yes" when asked, *"Did you gain any new insights - or experience any other personal benefits - from your participation in this session?"*

When asked what insights they gained from participating in the sessions, they mentioned a variety of insights and positive outcomes. Many appreciated the opportunity to vote on curriculum changes, better understand KSAs and gain clarity on the BILT processes. Employers also valued the collaboration between business leaders, educators, and community colleges, emphasizing the importance of partnership. Some mentioned how the session provided insight into the needs of different industries and the alignment of business objectives. Additionally, participants noted the importance of apprenticeships, the modification of curriculum to meet industry needs, and regional perspectives on industry challenges. Networking opportunities and the introduction of new members were also seen as beneficial. Overall, employers found the session useful for fostering collaboration, sharing best practices, and improving the alignment between industry and educational institutions.

Short-term Outcomes Evaluation

Customized Outcomes

2a: Increase from a baseline of 12 to a target of 50 the number of employers in the region active in a BILT for advanced manufacturing.

Business and Industry Leadership Team (BILT)

As described earlier in the report, one aim of the Grant Management team was to increase the number of employers in the region that are active in the BILT for advanced manufacturing. Establishing connections with industry is critical for developing curricula that are aligned with their needs. The Grant Management team considered a company to be an "active" member in the BILT if one of its members attended at least 60% of scheduled meetings in any 12-month period and submitted KSA input that reflects its organization's needs. Twelve employers were active in the BILT for advanced manufacturing at the start of the project. The Grant Management team's goal was to recruit an additional 38 employers for active participation in BILT activities for an overall target of 50 by the end of the sixteen-quarter grant period. Through the grant period, the Grant Management team added 106 employers to the original baseline of 12, which is 279% of its grant period target, for a total of 118 regional employers active in the BILT overall, which is 236% of its overall target (Table 4).

The number of employers in the region active in the BILT for advanced manufacturing during the grant period in relation to the grant period and overall total goals								
Baseline	Grant Year				Grant period total/goal	Grant period % achieved	Overall total/goal	Overall total % achieved
2020	2021	2022	2023	2024				
12	13	22	55	16	106/38	279%	118/50	236%

Table 4. Number of employers in the region active in the BILT for advanced manufacturing

Summary

The AWESM project effectively leveraged the BILT model to engage employers and align curricula with industry needs by collaboratively defining KSAs. Despite early challenges, such as inconsistent participation and skepticism about digital badges, the project addressed these issues through virtual meeting options, real-time feedback collection, and enhanced communication strategies, including the appointment of a Business Liaison. Over the grant period, AWESM exceeded its employer engagement target, growing from 12 to 110 active employers and developing KSAs for four manufacturing sectors. Surveys revealed high employer satisfaction and valuable insights gained, with suggestions for more structured materials and expanded networking opportunities leading to improved session organization and broader industry representation. This collaborative approach fostered curriculum relevance and strengthened industry-education partnerships.

Core Element: Enhanced Career Pathways Programs & Accelerated Learning Strategies

Implementation Evaluation

Implementation Evaluation Question

- How effectively are activities related to the development of enhanced career pathways programs and accelerated learning strategies being implemented? These include the identification and development of common KSAs mapped to curricula, the alignment of educational programs with sector needs, the enhancement of CPL processes, and the provision of academic support. What is working well? What challenges/barriers have emerged? What actions have been effective in addressing challenges?

Worked Well – Development of Common Language Content in Target Programs

After working with industry partners to identify the necessary KSAs for entry-level work in machining, welding, mechatronics, and industrial systems technology, the AWESM team worked closely with faculty at each of the consortium colleges to map the identified KSAs to their existing manufacturing-related courses and programs. This mapping exercise allowed the team to identify gaps where the current curriculum did not fully address all the critical competencies. It also highlighted areas of overlap and redundancy across the colleges.

Using these analyses, the faculty then worked collaboratively to redesign and align their courses. The AWESM team and consortium members then began the process of developing 21 regionally standardized courses with 11 for machining, 4 for welding, 2 for mechatronics, 1 for IST, and 3 courses that overlap mechatronics and IST. Importantly, this regional standardization of courses will allow students to seamlessly transfer credits between the consortium institutions. Moreover, each course is being designed so that students can earn 2-3 of the consortium-sponsored badges that are being developed.

The regionally standardized courses were developed collaboratively as each of the consortium colleges machining, mechatronics, IST, and welding provided relevant materials, including syllabuses, course maps, assignments, tests/quizzes, lectures, textbook sections, and, if desired, full course access. Once the material was gathered, it was used to create the new standardized courses directly aligned with the BILT KSAs student learning objectives and voted on and approved by industry representatives and faculty. To maintain consistency, the consortium colleges aligned on common course descriptions, learning objectives, content, and assessment methods. Once courses were completed, they were sent to instructors across the consortium for review. Edits were made from there until they met approval.

Throughout the process, the AWESM team facilitated regular meetings and working sessions with the college faculty and staff, as well as industry partners, to ensure that the courses were pedagogically sound while remaining aligned with industry requirements. The review process also enabled the team to address inconsistencies across institutions, maintaining a high standard of quality and relevance in each course.

At the time of this report, 13 regionally standardized curriculum courses were completed and uploaded to OER platforms, including openNCCC, OER Commons, and Merlot. The 13 developed courses include 9 of the intended 11 machining courses and all 4 welding courses, as shown in Table 5. The remaining 8 courses including 2 for machining, 2 for mechatronics, 1 for IST, and 3 courses that overlap mechatronics and IST - were still in progress when this report was written.

Content Area	Digital Badge	Course Number	Date Added
Machining	Industrial Safety Course	ISC-112	02/02/2024
Machining	Intro to CNC Machining	MAC-121	02/02/2024
Machining	CNC Turning	MAC-122	04/04/2024
Machining	Machining Applications!	MAC-141	04/09/2024
Machining	Machining Application II	MAC-142	05/22/2024
Machining	CNC Milling	MAC-124	10/08/2024
Machining	Machining Technology I	MAC-111	10/08/2024
Machining	Machining Technology II	MAC-112	10/08/2024

Content Area	Digital Badge	Course Number	Date Added
Machining	Advanced CNC Tuning	MAC-222	11/04/2024
Welding	GMAW [MIG] FCAW-Plate	WLD-121	02/02/2024
Welding	Symbols and Specifications	WLD-141	02/02/2024
Welding	Cutting Processes	WLD-110	03/04/2024
Welding	Basic Welding Processes	WLD-112	03/21/2024

Table 5. Standardized curriculum courses that were created in Odigia and uploaded to OER platforms (e.g., openNCCC, OER Commons, Merlot).

In September 2024, interviews were conducted with consortium leads. The interviews included questions designed to gather insights into their satisfaction with the processes, activities, and strategies implemented during their participation in the AWESM grant, particularly related to the efforts to develop common language content in target programs. The interviews also included questions to determine - from their point of view – how participating in the AWESM grant-funded consortium has benefited students, their institution, the region, and even themselves. Results from those particular questions will be included in later sections of this report. Four of the eight consortium leads agreed to participate. A copy of the protocol is provided in Appendix C.

Regarding satisfaction with the process, the consortium leads expressed overall strong satisfaction with the activities and strategies implemented during this process of identifying common language content for standardized courses. Many highlighted the value of the collaborative framework established by the grant, which brought together institutions and industry partners. This collaborative environment fostered the exchange of resources, best practices, and problem-solving strategies that helped break down barriers both within and across consortium institutions. One interviewee appreciated how the process facilitated "getting our faculty talking amongst each other, so we're not operating in a silo," while another emphasized the need for regional cooperation, noting that "colleges are going to have to learn how to play better in the sandbox" to address the growing workforce needs effectively.

The regular meetings, including the BILT sessions, were particularly appreciated for their role in bringing together diverse parties to align curricula with industry needs. These sessions were instrumental in defining KSAs for various technical fields, enabling colleges to ensure their programs were responsive to employer demands. As one participant mentioned, "participating in the mechatronics BILT was a good experience," as it allowed for meaningful discussions and the opportunity to benchmark against industry standards. This kind of structured engagement was viewed as critical for fostering a regional approach to workforce development, where institutions worked together rather than in isolation.

A significant factor contributing to the positive feedback was the effective leadership and facilitation provided by the grant manager. Many interviewees praised the manager's ability to create an inclusive and collaborative environment where all voices were heard and valued. One participant described the facilitation style as "an art more than a science," highlighting the skill involved in making participants feel welcomed and included. Another interviewee added that the grant manager "does a great job of making sure to solicit everyone's contribution in a way that is welcoming and inviting," which helped maintain a high level of engagement and collaboration throughout the grant's duration.

Challenges - Development of Common Language Content in Target Programs

While the overall feedback was highly positive, consortium members also provided constructive suggestions for improving the process. One area identified for improvement was the need for more flexible meeting formats. Several interviewees suggested that increasing the number of virtual meetings could have enhanced participation, particularly from faculty members and industry representatives who often faced scheduling conflicts. One interviewee mentioned that while in-person meetings were valuable for networking and understanding each college's facilities, they were often challenging to coordinate due to "different schedules" and other responsibilities. Offering more virtual options could have made it easier for more participants to engage without the logistical burden of travel.

Another suggestion for improvement involved better engagement with instructors from the start of the process. One participant noted that while there was good representation at BILT meetings, more intentional planning could have ensured more robust engagement from instructors. They emphasized that involving instructors early on and potentially compensating them for their time could have increased their buy-in and effectiveness as "ambassadors" for the grant's initiatives. As they put it, "If you don't get the instructors who are on the ground level involved early... how productive will the process be?" This insight highlights the importance of early and meaningful engagement of key stakeholders to maximize the grant's impact.

Another area where improvements were suggested was coordinating across multiple colleges, each with its own schedules, priorities, and administrative processes. One interviewee described the difficulty of "finding times and days to get everybody at the table," particularly when attempting to coordinate among eight colleges. This feedback underscores the need for streamlined coordination efforts and potentially more flexible scheduling to accommodate the diverse participants involved in such a large-scale initiative.

Solutions – Development of Common Language Content in Target Programs

Despite these challenges, interviewees were impressed with how the grant process adapted to evolving needs and circumstances. The flexibility and responsiveness of the grant team were key factors in maintaining high satisfaction levels among participants. One interviewee observed that the consortium "figured out how to do it once you're almost ready to quit doing it," emphasizing the continuous improvement in processes over time. This adaptability allowed the team to refine their approach based on feedback and changing conditions, ensuring that the grant remained relevant and effective throughout its duration. Moreover, the grant process allowed colleges to leverage their strengths and resources effectively, building on existing frameworks such as strong apprenticeship programs to enhance regional workforce development efforts. This approach ensured that the grant's initiatives were not only impactful but also sustainable beyond the grant period.

Working Well - Enhancement of Credit for Prior Learning Opportunities

At the project's start, many consortium schools did not historically keep records of prior learning credits awarded. Despite this, the CPL initiatives have made significant progress, including successfully collecting baseline data, developing standardized processes, and creating a CPL Guidebook. The project has also seen the expansion of CPL opportunities, particularly for military personnel and technology integration to support competency-based CPLs. Additionally, collaboration across departments and adopting state-level credential crosswalks have further strengthened the implementation of CPL activities across the consortium. The key CPL activities and their deliverables are visualized in Figure 15 and outlined in Table 6.

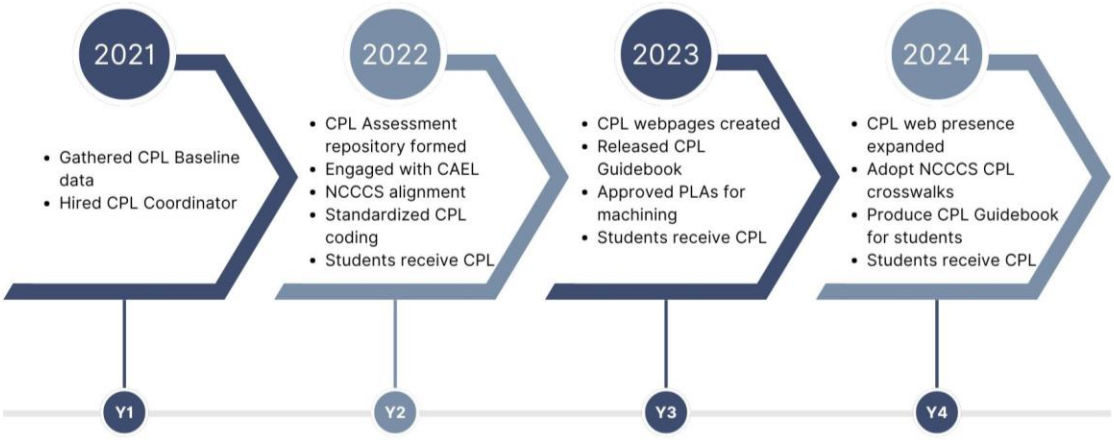


Figure 15. Key project CPL milestones. Note: The CPL coordinator hired in 2021 left in 2022, and a new coordinator took over in 2023.

Activity	Deliverable
Baseline Data Collection	Prior Learning Credit baseline data was successfully obtained, and credit was awarded to students in targeted programs.
Credential Engine Collaboration	Credential Engine was contracted to analyze gaps in credential data across college websites.
CPL Coordinator Hired	A CPL Coordinator was hired and was instrumental in advancing the CPL initiatives, including attending relevant conferences and certification courses.
Development of Credit for Prior Learnings (CPLs)	Forsyth Tech developed and approved PLAs for MAC-141 and MAC-142, which were shared with the consortium.
CPL Guidebook	A CPL Guidebook was drafted, and a student version is forthcoming. The guidebook is continually updated with input from the Grant management team and the NCCCS.
Standardization of CPL Coding	Standardized CPL coding and processes have been instituted across the consortium, and efforts to create a consistent application process are underway.
CPL Website and Marketing Efforts	Progress has been made in developing a CPL landing page for college websites, and ongoing work in the marketing and ITS departments to support this initiative.
Repository of Assessments	A repository of course exams and proficiency exams (e.g., for WLD-121) has been created, ensuring a structured approach to CPL assessments.
Expansion of Military CPL	The Grant Management team is actively exploring and expanding CPL opportunities for military personnel in collaboration with other community colleges and the System Office.
Collaboration and Training	Continuous collaboration with various departments, including registrars and curriculum coordinators, has supported the growth of

	CPL processes. Training sessions and meetings are regularly held to align practices across the consortium.
State-Level Crosswalks	The NCCCS has been developing credential crosswalks for CPL, which the consortium colleges are adopting after a review to ensure local industry alignment.
Technology Integration	Efforts to integrate technology that supports competency-based assessments linked to CPL are ongoing, with some colleges already using digital forms for these processes.
Statewide Standardization	The NCCCS hired an individual to oversee the standardization of CPL in 2024.

Table 6. Consortium CPL activities and deliverables.

These activities demonstrate substantial progress in implementing CPL initiatives, focusing on standardization, collaboration, and continuous improvement.

Challenges - Enhancement of CPL Opportunities

The consortium encountered several challenges in implementing CPL activities throughout the project. One significant issue was the incomplete institutional records for CPL, as many consortium colleges had not historically maintained such records. This problem was compounded by Year 2 state-level delays linked to the NCCCS's progress on CPL, further slowing implementation efforts. Staff turnover, notably that of the CPL Coordinator, also created some instability. Additionally, the Year 3 annual survey results highlighted the need for better communication regarding CPL and the activities of the grant. Throughout the project, process delays arose due to the initial lack of standardized student application forms and processes and the time-consuming process of creating standardized forms in OnBase. Moreover, in Year 4, unforeseen circumstances caused web hosting delays and a temporary de-activation of the CPL webpage. The CPL Coordinator left in 2024, and the position has yet to be filled, causing delays in CPL activities.

Solutions - Enhancement of CPL Opportunities

The project team responded to each of these challenges with agility and creativity. The CPL coordinator's hiring in Year 1 supported the coordination of CPL efforts across the consortium. During Year 2, CPL was designed for machining courses, and a repository of PLAs was created to support CPL in other areas. By the end of Year 2, all consortium colleges had instituted a standardized CPL coding system, and the consortium adopted the state's credential crosswalks. In Year 3, the CPL Guidebook was launched in Fall 2023, and a ticketing system to update the Guidebook was created. The Year 4 launch of CPL webpages further supported student awareness of CPL. Table 7 summarizes the project team's responses to the implementation challenges.

Challenge	Solution
Incomplete CPL records	The CPL Coordinator was hired to review and standardize CPL records across colleges, ensuring accurate and consistent reporting.
State-level delays	The project team collaborated with the System Office of the NCCCS to align efforts and stay updated on state guidelines, particularly for digital badging.
Staff turnover	A new CPL Coordinator and Curriculum Coordinator were hired to stabilize the team and advance CPL initiatives promptly.

No standardization processes/forms	The CPL Group updated policies, standardized forms, and streamlined processes while regularly updating the CPL Guidebook to ensure consistency.
Web hosting delays	The CPL Coordinator worked with Marketing and ITS to resolve web hosting issues, leading to the successful launch of the CPL landing page.
Incomplete CPL adoption	Designed and distributed assessments to consortium members and provided support to encourage full adoption across all colleges.
Communication gaps	Conducted training sessions and meetings to improve communication and ensure all stakeholders were informed about CPL developments.

Table 7. Consortium responses to implementation challenges.

Opportunities - Enhancement of CPL Opportunities

Numerous opportunities arose, which the project team successfully leveraged to advance CPL across the consortium colleges and at the state level. Significantly, in Year 2, the project team recognized an opportunity to align their work at the state level with the NCCCS. This collaboration resulted in the adoption of Credly which opens new possibilities for recognizing and validating student achievements in a modern, digital format that can be easily shared with employers. Through this collaboration with state personnel, the consortium's CPL work is advancing and benefiting from state-level credential crosswalks. Additionally, during project Year 3 the exploration of expanding CPL opportunities to military personnel and fields such as Early Childhood Education has opened new avenues for CPL application. This could increase the reach and impact of CPL, attracting a broader range of students to the consortium's programs.

Developmental Evaluation

Developmental Evaluation Questions:

- How satisfied are instructors and students regarding the project's activities and strategies related to CPL processes and students' satisfaction regarding academic support services, including tutoring and academic advising?
- How satisfied are instructors and consortium leads regarding the project's activities and strategies related to the identification of common KSAs and alignment with sector needs?
- How satisfied are students with the activities and strategies related to the identification and development of common KSAs mapped to curricula?
- To what extent are employers and teachers expressing attitudes and engaging in behaviors that demonstrate support for the project's activities and strategies?

The project team administered brief needs assessment surveys to machining, industrial systems technology, welding, and mechatronics instructors in the final weeks of April 2022 and April 2023 at all consortium institutions to assess their satisfaction with project's activities and strategies related to the identification of common KSAs and alignment with sector needs and gain an understanding of their views regarding CPL processes at their institutions. Students in their classes were also asked to complete a survey to learn about their views regarding CPL, as well as questions regarding the provision of academic support. For the 2022 survey, a total of 32 (51%) of the 63 instructors across eight consortium colleges who received an invitation completed the survey, while the 2023 survey was completed by a total of 34 (44%) of the 77 faculty who received an invitation. Copies of those surveys are provided in Appendix C.

Credit for Prior Learning (CPL) - Faculty

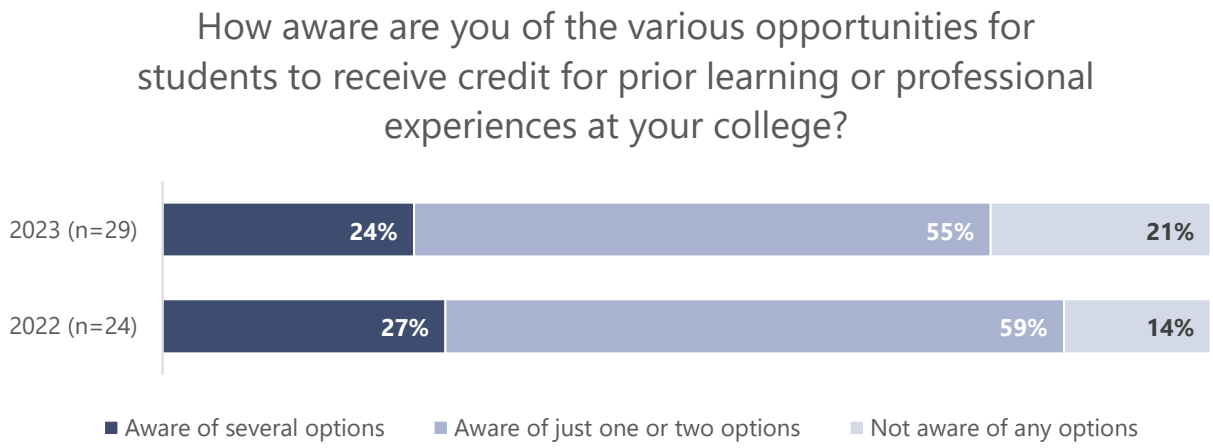


Figure 16. Response frequencies to the question, "*How aware are you of the various opportunities for students to receive credit for previous learning or professional experiences at your college?*"

An important component of this project is the ability for students to receive academic CPL or professional experiences. As such, faculty respondents were asked to reflect on their level of awareness regarding the opportunities to offer students credit for these experiences. In 2022, 86% and in 2023 79% of faculty respondents were aware of at least one option for students to receive CPL (Figure 16).
When asked about their level of satisfaction with the current processes for students to obtain CPL, 59% of faculty respondents in 2022 reported being at least "somewhat satisfied" with current processes, while 31% of the 2023 responding instructors reported being at least "somewhat satisfied." (Figure 17).

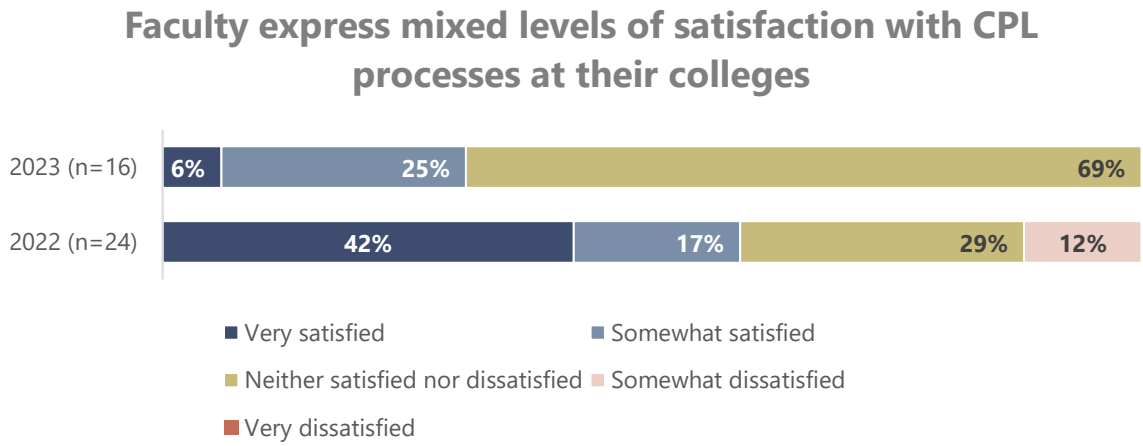


Figure 17. Response frequencies to the question, "*How satisfied are you with the current process that students have to go through to receive credit?*

Those who were satisfied with the current CPL processes were asked to identify what they liked about the process. One respondent shared that they liked evaluating students to determine if they were experienced enough to skip any program tasks or credits. Faculty respondents who were less satisfied with the current processes for students to obtain CPL were asked how the process should be improved (Table 8). Respondents

provided several recommendations, beginning with enhancing communication and transparency through clearer explanations of course expectations, the CPL process, and making proficiency exam information readily available. Some also recommended strengthening partnerships with industry to support career-related credits, such as CLEP, which would further align CPL opportunities with students' professional goals. Altogether, these improvements would make CPL more efficient, accessible, and fair for students. Other recommendations included implementing efficient, unbiased software for credit scoring and guaranteeing that credits are awarded within two weeks, which would streamline the process and reduce redundant scheduling.

What about the process should be improved?
2022
• Discussion between student & instructor to inform the student of the course expectations/previous completion requirements
• Higher-level classes should always substitute for lower-level classes.
• If students are changing careers and already have an AS or even BS why would not all the general studies be already transferred, they have been awarded a universal degree already.
• If we had an unbiased software program that could have the data loaded and give an option or credit score based on the data
• Institutional processes and procedures are not in place to support credit for prior learning.
• Knowledge regarding proficiency exams and whether or not they are offered for a course should be easier to access.
• Make a more official process, instructors should not be able to say the student knows the material and award credit
• More classes transferable
• Standardization of proficiency tests
2023
• Award credits applied within two weeks of application acceptance and notice of pending approvals to avoid redundant scheduling.
• Better collaboration with industry partners for students applying for CLEP
• Communication
• Explain the whole process in detail.
• I need to learn more about the process
• Information
• More knowledge passed on to faculty about different options on CPL and learning options for students.
• Overall understanding
• Staff should receive training on how program changes will affect their students. And be involved in the process of assessing for CPLs.
• Students need to have a path to receive credit for previous work experience
• Time frame

Table 8. Full-text responses regarding suggested improvements to the process for obtaining CPL.

The 2023 survey included a question asking instructors about ideas they had for raising awareness of CPL opportunities; they reported a variety of ideas for best reaching or communicating with their students (Table 9).

What - if any - ideas do you have for raising awareness of CPL opportunities among students?

- An easily accessible, common web link among the partnering institutions dedicated to CPL opportunities
- Entrance exams to see what they already know. Then build from there. Saves time.
- I think once I can get more AWS certifications, I can open the conversation to students about their options of furthering their learning experience through outside resources
- Inform students.
- Limits available. Restrictions.
- Questions on applications that asked questions about prior experiences etc.
- Sending emails with detailed information about this opportunity.
- Targeted marketing efforts and industry awareness among hiring professionals

Table 9. Full-text responses regarding ideas faculty had for raising student awareness of CPL opportunities (n=12).

Credit for Prior Learning (CPL) – Students

Faculty who were invited to complete the survey were also asked to administer a brief survey to students in each of their classes, which included questions about the opportunities that their college might offer for them to receive CPL. A total of 235 students across the consortium schools responded to the survey in 2022, and 180 students across the consortium schools responded to the survey in 2023.

In 2022, 67% of students reported being aware of at least one or two opportunities for students to receive CPL, and, of these respondents, 43% said that they had taken advantage of CPL opportunities at their institution. Among the student respondents in 2023, 72% indicated that they had obtained CPL credit.

For students who said that they were aware of CPL opportunities but had not taken advantage of them previously, most reported that they simply were not interested in doing so or did not have any prior learning or experience that would be eligible for obtaining credit (Table 10).

Can you briefly describe any barriers that have prevented you from pursuing credit for prior learning or workplace/industry experience at your college?

2022

- Not interested (22 responses)
- No applicable experience (19)
- Unaware of options (8)
- Time constraints (6)

2023

- Not interested/no prior learning (15 responses)
- No barriers (11)
- Time constraints (5)

Table 10. Coded open-ended responses to the question, "Can you briefly describe why you have not yet sought to receive credit for prior learning or experiences at your college?"

For students who indicated that they had taken advantage of CPL opportunities at their college, 69% of the 2022 students and 82% of the 2023 students reported being “somewhat” or “very satisfied” with the process for

receiving credit (Figure 18). Respondents who were at least "somewhat satisfied" with the process were then asked to identify what they particularly liked about the process, and most mentioned something related to the ease of obtaining CPL (Table 11).

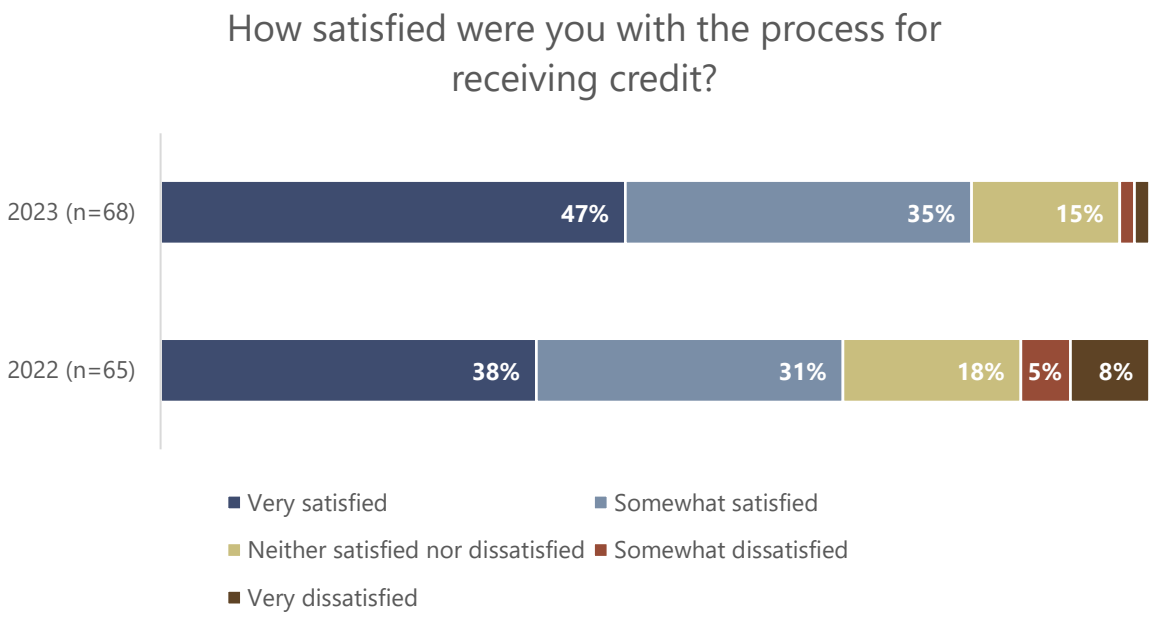


Figure 18. Student satisfaction with the process for receiving credit (n=68).

What did you like about the process for receiving credit for prior learning or workplace/industry experience?
2022
• Ease of obtaining credit for prior learning (6 responses)
• Helpful staff (4)
• Obtaining additional credits (4)
2023
• Fulfilling requirements more easily (7 respondents)
• Gain professional experience (2)
• Process simplicity (2)
• Timeliness of institutional feedback (1)

Table 11. Coded open-ended responses regarding what students liked about the process for receiving credit for prior learning.

Lastly, respondents who did not rate their satisfaction as "very satisfied" were asked to reflect on what could improve the process of obtaining CPL. Suggestions for improving the CPL process in 2022 focused on clearer messaging, broader eligibility, and a quicker, easier process. In 2023, feedback emphasized better equipment, software support, streamlining, increased funding, and more information sharing, including real-life applications (Table 12).

What about the CPL process should be improved?

2022

- Clearer messaging/explanation of the process (4 responses)
- Broaden eligibility/credits awarded (3)
- Easier/quicker process (3)

2023

- Equipment quality/availability (2)
- Software support (1)
- Streamline process (1)
- Provide more funding (1)
- Share process info (1)
- Share real-life applications (1)

Table 12. Coded open-ended responses regarding suggested improvements for the process of receiving credit for prior learning.

Academic Support - Students

Academic support is crucial for the AWESM project because it directly impacts student success, retention, and completion rates within programs that are designed to meet specific industry standards and skill requirements. Offering services like tutoring, mentoring, and access to academic resources helps students master challenging material, build confidence, and stay engaged in their educational paths, which is essential for a project focused on preparing students for highly technical roles in fields like advanced manufacturing and welding.

Students were asked whether they had received previous academic support services at their institution. These services include application/admissions support, technology support, financial aid counseling, tutoring services, academic counseling, and career services. Under half (43%) of the 2022 and over half (58%) of the 2023 student respondents said that they had used these services. Among students who had utilized academic support services at their institution, 67% of those in 2022 were "very" or "moderately" satisfied with the services they received, while 80% of students in 2023 reported the same level of satisfaction

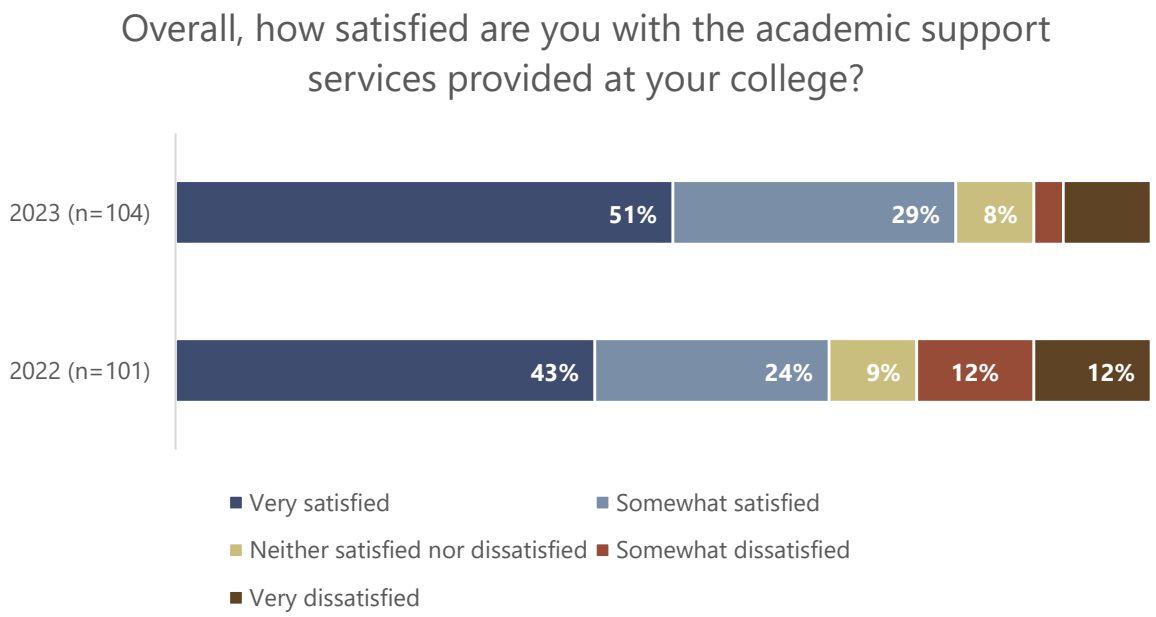


Figure 19. Response frequencies regarding student respondents' use of academic services at their college (n=180).

When asked about their awareness of their ability to request academic support services online or over the phone at their institution, most students from 2022 (88%) and 2023 (90%) reported that they were aware of these modes of support requests.

Instructor Satisfaction with the Identification and Alignment of KSAs

The April 2023 instructor survey included questions for instructors who had been involved in the KSA mapping process. When asked about their involvement in the KSA mapping process, nine of the 31 responding faculty reported that they had been involved. Most of those who had participated felt that the KSA mapping process was very effective or moderately effective as shown in Figure 20.

Figure 20. Faculty respondents' perceived level of effectiveness of the KSA mapping process (n=9).

Suggestions for improving the process included working collaboratively in a group setting and needing the input of industry professionals rather than human resource representatives from their companies. Additionally, approximately one-third of faculty respondents were satisfied with the results of the KSA mapping process (Figure 21).

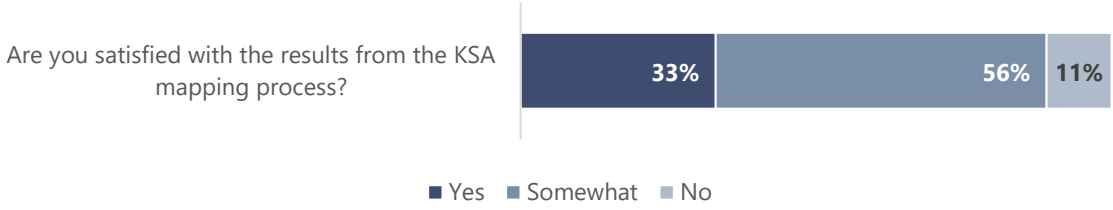


Figure 21. Faculty respondents' level of satisfaction with the results of the KSA mapping process (n=9).

One individual who was not satisfied with the results of the process cited that they were unsure of how to integrate results of the process into their role, while two other faculty respondents felt that the results of the mapping process were not noticeably different from the current learning objectives and programs.

Site Lead Support and Engagement with Project Activities and Strategies – Key to Sustainability

Evaluation Question

- To what extent are site leads expressing attitudes and engaging in behaviors that demonstrate support for the project's activities and strategies?

The ongoing success of the AWESM project depends heavily on the commitment of faculty and consortium site leads, who play a critical role in embedding its strategies into institutional practices. Their support is essential for maintaining regional collaboration, aligning educational programs with workforce needs, and expanding student opportunities. By actively engaging in project activities and advocating for its sustainability, these leaders have laid a strong foundation for the project's long-term impact.

Interviews with consortium leads revealed a deep alignment with the project's goals, demonstrated through active participation in initiatives such as BILT sessions, curriculum workshops, and inter-institutional meetings. Their contributions went beyond attendance, as they shared resources, shaped decision-making, and aligned curricula with workforce needs. One interviewee highlighted the collaborative process of identifying critical KSAs for the field, underscoring their hands-on involvement.

Leads also expressed a commitment to sustaining the project's successful practices, such as the integration of academic achievement specialists, badging systems, and improved curriculum alignment. These strategies were viewed as transformative for enhancing student retention and aligning programs with employer needs. Several institutions have already institutionalized these roles, reflecting their long-term value. Many leads emphasized the importance of maintaining the regional networks built through AWESM, noting that these relationships are vital for addressing future challenges collaboratively.

Participants spoke positively about the project's impact, particularly in expanding career opportunities through initiatives like badging and CPL, which provide students with modular, job-ready credentials. Faculty highlighted improved curriculum alignment, strengthened institutional cooperation, and closer ties with local employers as key outcomes. Several described proactive steps to sustain these benefits, including securing funding and implementing new practices inspired by the project.

The interviews demonstrate strong faculty support for AWESM's goals and strategies. Their active engagement, advocacy for sustainability, and alignment with the project's mission ensure its benefits will extend far beyond the funding period, supporting students and regional workforce development for years to come.

Short-term Outcomes Evaluation

Customized Outcomes:

> **5a.** Increase the number of participants who attain college credit for prior learning. **Goal** – A cumulative increase of 20% of the number of participants who attain PLC over the life of the project. The project will establish a baseline of the 2020-2021 level of PLC issued (# of students receiving credit) within the specified project programs.

The Grant Management team aimed to increase the number of participants who attain college CPL by 20% year over year and the number of college credits awarded for prior learning by the same percentage. The goal was for 39 students to earn college CPL during the grant period, resulting in a cumulative total of 48 students (including 9 from the baseline). Additionally, the target was to award 144 new college CPL credits during the grant period, for a total of 177 credits (including 33 from the baseline).

During the grant period, 51 students earned college CPL, exceeding the grant target by 131% and the overall target of 48 students by 125%. This achievement is detailed in Table 13 below

The number of students who attained college credit for prior learning in relation to the grant period and overall total goals								
Baseline	**Grant Year**				**Grant period total/goal**	**Grant period % achieved**	**Overall total/goal**	**Overall total % achieved**
2020	**2021**	**2022**	**2023**	**2024**				
9	18	8	7	18	51/39	131%	60/48	125%

Table 13. The number of students who attained college credit for prior learning

A total of 222 additional CPL credits were awarded during the grant period, surpassing the grant target by 154% and the overall target of 177 credits by 144%. The breakdown is shown in Table 14 below.

The number of additional college credits awarded for prior learning in relation to the grant period and overall total goals								
Baseline	**Grant Year**				**Grant period total/goal**	**Grant period % achieved**	**Overall total/goal**	**Overall total % achieved**
2020	**2021**	**2022**	**2023**	**2024**				
33	88	34	22	78	222/144	154%	255/177	144%

Table 14. The number of additional college credits awarded for prior learning

Short-term Outcomes Evaluation Question

- To what extent are the activities and strategies improving the feasibility, speed, and cost of acquiring the credentials needed for a desired job in machining, mechatronics/industrial systems technology, and welding?

The data from the interviews with consortium site leads indicated that the activities and strategies implemented through the AWESM project have significantly improved the feasibility, speed, and cost-effectiveness of acquiring the credentials needed for desired jobs in machining, mechatronics/industrial systems technology, and welding. By aligning curricula with industry needs, providing more flexible learning pathways, and taking steps to ensure that students receive non-academic supports when needed, the project has streamlined the process for students to obtain the necessary certifications and skills for employment in these technical fields.

Improved Feasibility for Credential Acquisition

According to site leads, the AWESM project has made it more feasible for a diverse range of students to acquire the credentials needed for jobs in machining, welding, mechatronics, and IST by creating more flexible and accessible educational pathways. One of the key strategies has been the implementation of modular credentialing systems, such as badging and CPL, which allow students to gain recognition for specific skills and competencies without needing to complete a full degree program all at once. As one interviewee highlighted, the badging system "allows students to go with something to show besides just a transcript," making it easier for students who might not be able to commit to a lengthy, traditional education program to still obtain valuable credentials. This modular approach is particularly beneficial for non-traditional students who may be balancing work, family, or other commitments and thus require more flexible options for progressing toward their desired certifications.

Additionally, the alignment of educational programs with regional industry needs through the BILT sessions has ensured that the credentials students acquire are highly relevant to current job market demands. By defining KSAs required by employers and integrating these into the curriculum, the project has helped create programs that are not only feasible to complete but also directly aligned with employment opportunities in the region. This alignment reduces the likelihood of students needing additional training or certifications post-graduation, further enhancing the feasibility of entering the workforce swiftly and effectively.

Increased Speed of Credential Attainment

The AWESM project's strategies have also contributed to increasing the speed with which students can attain the necessary credentials for jobs in machining, welding, mechatronics, and IST. One of the most impactful strategies has been the recognition and incorporation of CPL, which allows students to earn credit for skills and knowledge they have already acquired, either through previous education, work experience, or military service. This approach can significantly reduce the time it takes to complete a program, as students do not need to retake courses covering material they already know. As noted by an interviewee, "We have streamlined some of our processes for recognizing prior learning... this saves students both time and money."

The modular structure of badging also allows students to achieve credentials more quickly. Instead of committing to a full two-year or four-year program, students can earn smaller, stackable credentials that demonstrate specific competencies relevant to their desired job roles. This not only provides quicker access to employment but also allows students to continue their education and add more credentials as they gain

experience or seek advancement. Moreover, institutions have enhanced support systems, such as embedding academic achievement specialists who help guide students through their educational journey, keeping them on track and addressing any barriers to completion promptly. These roles have been described as "game-changers" for improving retention and completion rates, further speeding up the process of credential attainment.

Cost-Effectiveness of Credential Acquisition

The strategies implemented through the AWESM project have also made acquiring credentials more cost-effective for students pursuing careers in machining, welding, mechatronics, and IST. By recognizing prior learning and integrating badging systems, the project has reduced the need for redundant coursework and associated costs. For instance, CPL allows students to bypass courses they have already mastered, saving them both tuition fees and time that would otherwise be spent in classes. One faculty member mentioned, "Students who come in with previous experience can save both money and time by earning credits for what they already know, rather than having to start from scratch."

Moreover, the grant-supported initiatives have provided funding for critical resources, such as new equipment, renovated labs, and updated learning materials, which are essential for hands-on fields like machining, welding, mechatronics, and IST. These investments ensure that students have access to high-quality training without incurring additional costs that might otherwise be passed on to them. Some institutions have also used grant funds to provide students with essential tools and safety equipment needed for these programs, removing financial barriers that might prevent some students from enrolling or completing their training.

Additionally, the incorporation of academic achievement specialists and other student support roles, funded by the grant, has helped reduce the financial burden on students by guiding them through the most efficient path to credential completion. These specialists help students navigate course selections, apply for financial aid, and access other support services, ultimately helping them avoid unnecessary costs and delays. As one interviewee put it, "The academic achievement specialists have been crucial in helping students find the shortest, most cost-effective path to graduation and employment." These academic achievement specialists have been so effective that the institution will continue to fund these positions in the future.

Summary

The AWESM project successfully developed enhanced career pathways and accelerated learning strategies through collaboration with industry partners and faculty across consortium colleges. By identifying 170 critical KSAs for fields such as machining, welding, mechatronics, and industrial systems technology, the team designed 54 micro-credentials and 21 regionally standardized courses, nine of which were completed and uploaded to open educational resource platforms. These courses allow seamless credit transfer and equip students with credentials tied directly to workforce demands. The project emphasized collaboration through BILT sessions and regular faculty meetings, which were pivotal in aligning curricula with employer needs. Despite challenges like scheduling conflicts and the need for greater faculty engagement, solutions such as virtual meetings and standardized course materials enhanced participation and consistency. Participants highlighted the transformative impact of initiatives like badging systems, CPL, and modular credentials on improving student retention and job readiness. Faculty and site leads expressed strong satisfaction with the project's collaborative framework, which fostered innovation and regional cooperation, laying a solid foundation for sustainable workforce development.

Core Element: Strategic Alignment to Workforce Development Systems

Implementation Evaluation

Evaluation questions:

- How effectively are Alignment to Workforce Development System activities and strategies being implemented? These include supporting WIOA enrollment and engagement and the provision of holistic support services for students.
- What is working well? What challenges/barriers have emerged? What actions have been effective in addressing challenges? What – if any – actions have been effective?

The Grant Management team recognizes that many students face challenges beyond academic motivations and abilities that can hinder their capacity to achieve their educational goals. Such challenges include financial and time constraints such as limited income and caregiver responsibilities. Consequently, it is important for the Grant Management team to leverage the resources provided through state-funded programs such as WIOA and to encourage and support access to public and private holistic services (e.g., daycare support) for students and trainees who want to earn credentials and obtain better jobs in machining, mechatronics/industrial systems, welding, or related programs of study enhanced through the project.

Working Well - WIOA

The consortium made significant progress in implementing strategies to support WIOA enrollment and engagement. In Year 1, each college identified Intake and Success Coaches, whose names were provided to the Workforce Development Boards to aid in the referral process. By the end of Year 1, all WIOA students still enrolled had been assigned to a Success Coach. A WIOA referral process was successfully implemented across the consortium, which has been instrumental in identifying and supporting eligible students. Additionally, despite the lower-than-expected participation rates, colleges have been diligent in providing comprehensive, wraparound services to their entire student population, ensuring that all students receive the necessary support. These support services are discussed in more detail in the Holistic Student Support section of this report. Engagement with local Workforce Development Boards has been strong, with some colleges taking the initiative to reach out to potentially WIOA-eligible students, further aligning educational opportunities with workforce needs.

Challenges - WIOA

The consortium colleges had faced several challenges in increasing WIOA participation rates. Participation was initially lower than expected, partly due to the pandemic's impact on the labor market, where employers are hiring individuals with lower qualifications, thus reducing the pool of WIOA-eligible students. Additionally, the availability of HEERF and LongLeaf grant funds during the pandemic decreased the necessity for students to seek WIOA funding, further contributing to the decline in participation.

Solutions - WIOA

To overcome these challenges, the consortium implemented several proactive solutions. Colleges have adopted innovative outreach strategies, reaching out to students who may be eligible for WIOA funding to increase referrals and participation. These efforts are complemented by continued collaboration with Workforce Development Boards and NCWorks representatives to refine the WIOA application process and expand outreach to WIOA-qualified individuals. These steps have been crucial in addressing the barriers to enrollment and ensuring that students are aware of and can access the support available to them through WIOA programs.

Opportunities WIOA

The proactive measures taken by the consortium have also revealed several opportunities for further improving WIOA engagement. The outreach to potentially WIOA-eligible students provides a valuable opportunity to increase participation in WIOA-funded programs, especially as the job market continues to evolve. Additionally, the holistic services provided to the broader student population can be leveraged to attract more students into WIOA programs, potentially increasing enrollment as awareness and understanding of the available support grow. Lastly, the ongoing meetings and collaborations with local Workforce Development Boards and NCWorks present an opportunity to build stronger partnerships to support future WIOA engagement and ensure that more students benefit from these critical programs.

Working Well - Student Holistic Support Services

By Year 4, the consortium had far exceeded the grant goal of 25 public and private entities contributing to holistic student support. In addition to holistic student support provided by community partners, each consortium college provides a broad array of in-house student support. Table 15 provides an overview of these supports and an indication of the consortium institutions providing those services and options that remove barriers to students' educational progress.

Student Support Service	ACC	DDCC	FTCC	GTCC	MCC	RCC	RKCC	SCC
Tutoring Services	X	X	X	X	X	X	X	X
Academic Advising and Success Coaching	X	X	X	X	X	X	X	X
Counseling and Mental Health Services	X	X	X	X	X	X	X	X
Career Services (including Career Coaches)	X	X	X	X	X	X	X	X
On-Campus Food Pantries	X	X	X	X	X	X	X	X
Emergency Financial Assistance	X	X	X	X	X	X	X	X
Student Life and Engagement Activities	X	X	X	X	X	X	X	X
Single Stop Services	X	X	X			X		
Evening and Weekend Courses	X		X	X	X	X	X	X
Experiential Learning Opportunities	X	X	X	X	X	X	X	X
Technology Access (Loaned Computers)	X	X	X	X	X	X	X	X
Health and Wellness Services	X	X	X	X	X	X	X	X
Specialized Support Programs	X	X	X	X	X	X	X	X
Childcare Support (such as Diaper Pantries)		X	X	X	X	X	X	X
Credential and Certification Programs	X	X	X	X	X	X	X	X

Table 15. Consortium College holistic student support.

Challenges – Student Holistic Support Services

Despite these successes, the consortium faced challenges in tracking the specific impact of support services on targeted student populations. Some colleges have also reported low student engagement with support services, such as Intake and Success Coaches, indicating a need for more effective outreach.

Solutions – Student Holistic Support Services

To address these challenges, the consortium has strengthened partnerships with community organizations to expand the support services available to students beyond those offered at each consortium college. Innovative

engagement strategies, such as after-hours classes, weekend courses, and specialized camps, have been employed to meet current and future students' needs better. Predictive analytics and expanded data collection have also enabled colleges to identify and support at-risk students more effectively, ensuring that resources are directed where they are needed most.

Opportunities – Student Holistic Support Services

The comprehensive support services already in place provide a strong foundation for further improving student retention and success. Additionally, strengthening partnerships with local employers and utilizing educational software like ToolingU offer avenues to integrate holistic support with career pathway development, ensuring that students are well-equipped for their future careers.

Developmental Evaluation

Evaluation question

- What are students' perceptions regarding the provision of non-academic support services, including basic needs, financial counseling, and mental health?

Student Survey

On the student survey, respondents were asked whether they had used any non-academic support services offered at their college. Non-academic support services might include direct assistance with daycare, transportation, and access to technology (e.g., computer labs). They might also include indirect assistance through referrals to medical/mental health services or legal assistance.

Most students from the 2022 survey (79%) and the 2023 survey (73%) said that they had not previously used non-academic support at their college.

Of the respondents who reported having used non-academic support services on campus, over 80% were "somewhat" or "very satisfied" with the interactions they had during their session (Figure 22).

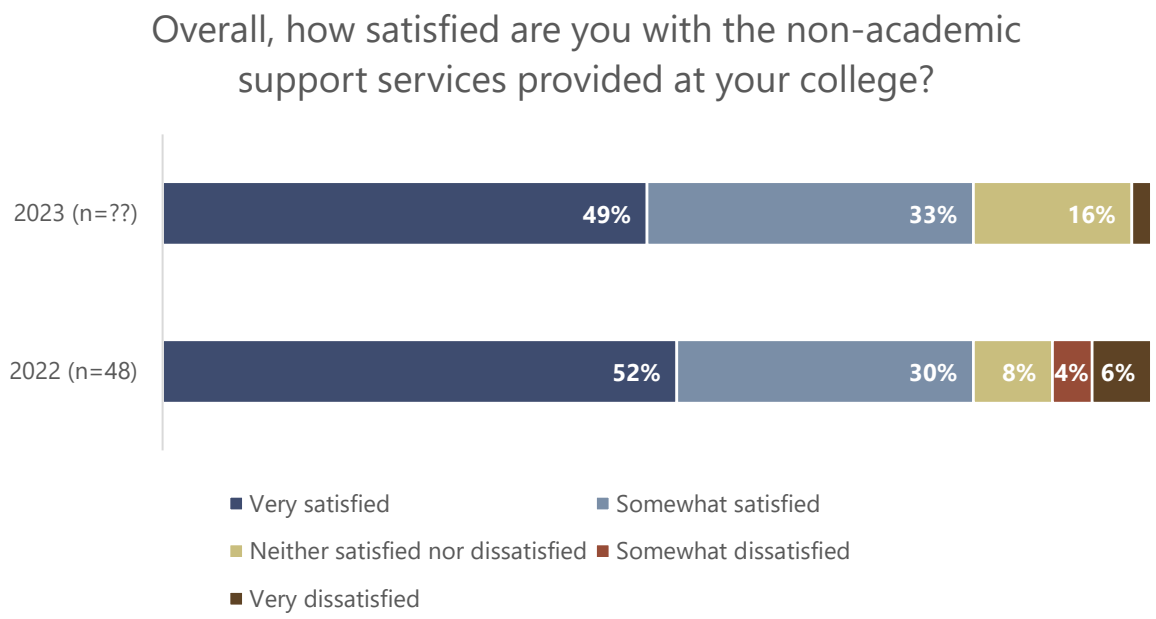


Figure 22. Student satisfaction with the non-academic support services offered by their college.

Students who reported being satisfied with their interactions were then asked to identify what they particularly liked about their experience with non-academic support services. Eight of these students reported being particularly satisfied about having helpful staff on campus available to support them and six mentioned access to computer labs (Table 16).

What about your college's non-academic support services are you particularly satisfied with?
2022
• General support (8 responses)
• Access to computer labs (6)
• Food services (3)
• Ease of access to support (2)
• Support from faculty (2)
2023
• Tech availability (11 respondents)
• Access to resources (5)
• Personal support (3)
• Financial support (1)
• Support staff (1)
• Transportation services (1)

Table 16. Coded open-ended responses regarding the factors of their school's non-academic support services that they were particularly satisfied with (n=18).

All respondents were asked if they were aware that their college offers online or phone options for requesting non-academic support services at their institution. Over 75% of students reported that they were aware of the ability to request services through these mediums.

Short-term Outcomes Evaluation

Customized outcomes:

> **4a:** Achieve year-over-year percentage increases in the number of WIOA-enrollment candidates in machining, mechatronics, welding, or related programs of study enhanced through the project. Goal = A 10% cumulative increase over four years from a baseline to be established in the first quarter of the project.

As one indicator of alignment with the Workforce Development System, the Grant Management team aimed for a 10% cumulative increase in WIOA-enrolled candidates in machining, mechatronics/industrial systems, welding, or related programs of study enhanced through the project from a baseline of sixteen. The overall target was 74 WIOA-enrolled students over the four years, which means that the team was seeking an additional 58 WIOA-enrolled students over the course of the grant. By the end of the 15th quarter, the Grant Management team had added 523 WIOA-enrolled students across the eight consortium colleges which amounts to 902% of the grant period goal and 728% of the overall goal (Table 17). The large increase in 2023 was partly due to Surry Community College's very successful efforts to enroll students in WIOA for their targeted programs.

The number of WIOA-enrollment candidates in machining, mechatronics, welding, or related programs of study in relation to the grant period and overall total goals								
Baseline	Grant Year				Grant period total/goal	Grant period % achieved	Overall total/goal	Overall total % achieved
2020	2021	2022	2023	2024				
16	33	39	378	73	523/58	902%	539/74	728%

Table 17. Number of WIOA-enrollment candidates in machining, mechatronics, welding, or related programs of study

> **4b:** Increase the number of public and private entities from zero to 25 in the regional education-workforce ecosystem that provide holistic support for students and trainees along the certified career pathway for advanced manufacturing.

Another indicator of alignment with the Workforce Development System for the project is the number of public and private entities in the regional education-workforce ecosystem that provide holistic support for students and trainees along the certified career pathway for advanced manufacturing across the eight consortium colleges. Holistic support includes academic support, such as advising and tutoring, and non-academic support, such as help providing transportation, childcare, and food insecurity as barriers to success. The goal for the Grant Management team was to increase the number of connected public and private entities from zero to 25 over the course of the four-year project. By the end of the 15th quarter of the project, 356 connected public and private entities in the regional education-workforce ecosystem were providing holistic support services in this capacity, as shown in Table 18, which was 1424% of the grant goal. The sharp increase in numbers in 2022

was due to the consortium colleges providing a more accurate account of the holistic services they offer. Forsyth Tech also greatly expanded its student holistic outreach in 2022, partnering with civic and community groups to better support students holistically.

The number of public and private entities in the regional education-workforce ecosystem that provide holistic support for students in relation to the grant period and overall total goals								
Baseline	Grant Year				Grant period total/goal	Grant period % achieved	Overall total/goal	Overall total % achieved
2020	2021	2022	2023	2024				
0	25	290	39	2	356/25	1424%	356/25	1424%

Table 18. The number of public and private entities in the regional education-workforce ecosystem that provide holistic support for students

Summary

The AWESM project successfully aligned education with workforce development by enhancing WIOA enrollment, expanding holistic student support, and forming partnerships with 356 public and private entities, far exceeding its goal of 25. By assigning Success Coaches, establishing a WIOA referral process, and collaborating with Workforce Development Boards, the project enrolled 510 students in WIOA programs, surpassing its target by 879%. Holistic support services, such as tutoring, childcare, career coaching, mental health counseling, and emergency financial assistance, addressed non-academic barriers to student success. Innovations like evening and weekend classes, experiential learning opportunities, and loaned computers further improved accessibility and ensured students could balance education with other commitments. Despite challenges like low initial WIOA participation and tracking service impacts, the project used virtual outreach, predictive analytics, and enhanced communication to boost awareness and engagement. By equipping students with the resources, credentials, and support needed for high-demand careers, the project not only improved educational outcomes but also strengthened the regional workforce system and set a foundation for continued collaboration between education and industry partners.

Core Element: Systems Change/Accelerated Learning Pathways

Implementation Evaluation

Implementation Evaluation Question

- How effectively are activities and strategies related to badging being implemented? What is working well? What challenges/barriers emerged? What actions have been effective in addressing challenges? What opportunities have emerged? How are those opportunities being leveraged?

Working Well – Digital Badges

As previously noted, the AWESM team and consortium members are actively developing 21 regionally standardized courses, including 11 for machining, 4 for welding, 2 for mechatronics, 1 for IST, and 3 for mechatronics and IST. To further enhance and validate students' knowledge and skills—and to ensure employers have confidence in these abilities—the team is also creating digital badges that students can earn. The goal is for these digital badges to gain acceptance from employers, thereby increasing students' chances of being hired. The initial step in this process involved developing 54 micro-credentials, which are bundled into the 21 standardized courses, as described earlier.

The partnership with Education Design Labs (EDL) drove significant progress in Year 4. Through collaboration with EDL, consortium site leads, faculty, and staff organized the KSAs into 54 micro-credentials designed for entry-level employment. Input from the Industry Lead and Business Liaison ensured alignment with employer expectations. These micro-credentials are now being converted into digital badges using Credly. Once finalized, the badges will be publicly available, allowing others to freely access and use the content.

During this time, an employer engagement strategy was also developed. However, the Forsyth team and consortium members collectively decided to delay its implementation until after the RAM BILT meeting in October. Additionally, the AWESM team is integrating the badges into the 21 standardized courses, enabling students to earn badges as they progress through the curriculum. This integration aims to create a skills-based hiring pipeline for manufacturers.

Alongside the 54 custom-developed badges, the project has incorporated 59 existing industry-recognized badges from organizations like the National Coalition of Certification Centers (NC3). These badges correspond to the identified KSAs and are utilized by consortium colleges in response to local employer demands, as well as guidance from local and regional BILTs and advisory boards.

The overarching strategy is to offer a comprehensive set of stackable, industry-relevant badges that students can earn through the consortium's programs. By combining custom-sponsored badges with industry-recognized credentials, the project aims to establish a robust credentialing system that meets the needs of both students and regional employers.

Challenges – Digital Badges

State-level delays primarily stemmed from technical issues with the Credly platform and the Destiny One system, which were essential for developing and implementing digital badges. These delays impacted the project by slowing down the rollout of digital badges across the consortium. As the North Carolina Community College System (NCCCS) Office was responsible for codifying digital badge guidance documents and providing institutional Credly accounts, the delays meant that the consortium had to wait longer to receive the final guidelines and tools to implement the badges fully. This postponed the integration of digital badges and caused some colleges to hold off on badge development, resulting in slower overall progress toward achieving the project's goals.

Several challenges arose due to faculty-related issues during the implementation of the project. One significant challenge was faculty resistance to using the standardized curriculum, despite having been involved in creating these materials. This resistance slowed the adoption and integration of new digital resources and teaching methods. Some faculty voiced concerns about introducing new credentials, questioning their necessity given the availability of existing degrees and certificates that serve similar purposes. Additionally, many colleges faced faculty vacancies, particularly in specialized areas like machining, which created difficulties in developing and delivering the new courses required by the project. Reduced faculty bandwidth made it challenging for some faculty to take on additional course development and implementation responsibilities. These challenges collectively hindered the pace at which new curricula and digital badges could be developed and rolled out across the consortium.

Solutions Digital Badges

The project team took several proactive measures to address the challenges linked to state-level delays. First, they continued to develop course materials internally without waiting for state guidance to catch up, ensuring that progress was made despite delays. The team worked closely with the NCCCS Office to stay informed and align their efforts with the broader state-wide initiatives as soon as the guidelines became available. Additionally, the project team regularly met with the System Office representatives and relevant parties to monitor the situation, provide feedback, and ensure that any available interim guidance was implemented promptly. They also leveraged their partnerships with community organizations and industry partners to maintain momentum in other project areas, such as aligning KSAs with curriculum and developing course content. This approach allowed the project to continue advancing its objectives while mitigating the impact of the delays on the overall timeline.

The project team implemented several strategies to address the challenges linked to faculty resistance and limited bandwidth. Recognizing the resistance to using digital platforms like Odigia, the team provided targeted training and one-on-one support to help faculty members become more comfortable with the new tools and resources. They also involved faculty in the development process to increase buy-in and reduce resistance to the changes related to offering new types of credentials to students. To tackle the issue of faculty vacancies and overload, the project team secured permission to hire additional staff, such as a part-time OER Evaluator and a full-time curriculum coordinator to support the development and digitization of course materials. In instances where hiring was not feasible, they enlisted the help of retired faculty members and a summer intern to assist with course development and review. These volunteers brought valuable experience and helped alleviate the workload on current faculty. Additionally, the team prioritized the creation of a master template for course content, which streamlined the development process and made it easier for faculty to manage their responsibilities. These efforts helped mitigate the impact of faculty-related challenges and allowed the project to continue progressing toward its goals. During Year 4, however, the project team decided to organize extensive faculty training sessions led by EDL to address knowledge gaps and support faculty in incorporating badges into their courses. Training resources were designed to simplify badge issuance and align them directly with course objectives, demonstrating the real-world application of skills acquired.

As the funding period ends, the project team is implementing a structured engagement strategy by collaborating with faculty to define industry-relevant badge skills, creating outreach materials, and gathering iterative feedback from employers to ensure that these skill badges align with labor market needs, are validated by industry partners, and are seamlessly integrated into educational platforms for student and employer access.

Beginning in July 2024, the project team initiated a comprehensive approach to badge development, starting with a detailed timeline and initial meetings with Welding instructors to align the specific skills each badge would represent. This early collaboration established a strong foundation for ensuring that badgeable skills accurately reflect both industry needs and entry-level job requirements. Key preparatory tasks included drafting an elevator pitch and email templates to introduce badges to potential employer partners designed to effectively communicate the badges' relevance to current labor market demands. The team further aligned badge definitions with labor market analyses and instructor feedback, ensuring the skills represented are those that employers value most.

Throughout August 2024, additional groundwork was laid, including the creation of tracking documents to monitor employer engagement, the finalization of badge definitions, and adjustments to the badge skills based on instructor input. Faculty from all four targeted programs provided direct feedback in targeted meetings, allowing the team to refine badge language and align it with industry terminology and employer requirements. The next step, which began in Fall 2024, was to engage in efforts to gather feedback from employers on the relevance and effectiveness of the badges in meeting hiring needs and addressing skill gaps.

Following this feedback cycle, finalized badges will be published on platforms such as Credly and Credential Engine for broader visibility and official recognition. Additionally, the consortium is working to integrate these badges into the consortium college's various LMS applications, including Blackboard, Moodle, and Canvas and develop systems for automatic badge awarding through these platforms. This multi-faceted approach ensures that badges are not only industry-relevant and validated by employers but are also accessible and seamlessly integrated into educational programs for broad student and employer engagement.

Opportunities Digital Badges

Digital badging offers AWESM significant opportunities to enhance industry engagement and improve student career outcomes by establishing badges as recognized job-relevant credentials. Strengthening partnerships with employers to endorse specific badges as pre-qualifications for roles in fields like OSHA safety or Lean Six Sigma could increase badge credibility and directly align educational programs with hiring standards. This collaboration could also extend to HR departments in various sectors, making badges a practical addition to job descriptions and hiring preferences, thus boosting students' job prospects.

The AWESM grant team is also considering the development of customized badges for employers as a way to leverage their efforts and address specific industry needs. This approach would allow companies to select relevant competencies from a broader menu of skills identified through the grant work. The badges would be tailored to individual employer requirements, potentially accelerating the onboarding process for new hires. By verifying specific skill attainments, these badges could help increase the pool of qualified candidates and simplify the assessment of potential employees. By focusing on employer-specific competencies, the badges could help ensure new hires are better prepared for their roles, potentially reducing training time and improving productivity.

Short-term Outcomes Evaluation

Customized Outcomes:

> **2b:** Increase from a baseline of zero to a target of 25 the number of sector employers incorporating digital badging as a preference in employee recruitment.
>
> **3b:** Introduce digital badging that maps to BILT-defined KSAs that reflect what employers need students to learn from machining, mechatronics/industrial systems technology, and welding programs. **Goal** - create 70 distinct badges based on KSA's as defined by BILT-member employer partners.
>
> **5b:** Increase the use of badges to align the education-workforce system and provide links for job seekers and incumbent workers who can move seamlessly at their own pace along regional career

pathways in manufacturing. Issue badges to students. **Goal** - Issue 1150 individual badges to students from the pool badges 70 badges created.

Tables 19 and 20 illustrate significant progress the project team has made in terms of badges available to students but also reveal the complexities in aligning educational credentials with employer expectations. For Outcome 3b, 84% of the target for creating 70 distinct badges based on BILT-defined KSAs was achieved by Q3 2024, with much of the progress concentrated in later quarters. This achievement highlights the success of the collaborative efforts between AWESM and employer partners in aligning the job-ready skills needed in machining, welding, mechatronics, and IST with existing badges while guiding the creation of new badges for students to earn. The concentrated development efforts required in the later quarters are partially due to early state-level delays in implementing the Credly platform, which hindered the pace at which badges could be created and distributed across consortium colleges. Additionally, inconsistencies in state-issued guidance initially caused some colleges to pause badge development, while others struggled with redesigning independently developed badges to align with state protocols.

The number of distinct badges based on KSA's as defined by BILT-member employer partners developed through the project in relation to the grant period and overall total goals								
Baseline	**Grant Year**				**Grant period total/goal**	**Grant period % achieved**	**Overall total/goal**	**Overall total % achieved**
2020	**2021**	**2022**	**2023**	**2024**				
0	0	0	0	59	59/70	84%	59/70	84%

Table 19. The number of distinct badges based on KSA's as defined by BILT-member employer partners developed through the project

The tables also reveal that badge issuance for students, while progressing steadily, has reached only 710 or 62% of the goal to distribute 1,150 badges by the end of the funding period all of which were the already developed industry-recognized badges that align with the industry-identified KSAs. The delays already described prevented the team from being able to launch and start issuing the 54 consortium-sponsored badges in time to meet this goal. A list of the badges and the number of students earning each is provided in Appendix D.

The number of individual badges issued in relation to the grant period and overall total goals								
Baseline	**Grant Year**				**Grant period total/goal**	**Grant period % achieved**	**Overall total/goal**	**Overall total % achieved**
2020	**2021**	**2022**	**2023**	**2024**				
0	0	0	0	710	710/1150	62%	710/1150	62%

Table 20. Number of individual badges issued

Due to the delays in creating the consortium-sponsored badges, the project team was also not able to meet the goal of increasing the number of sector employers incorporating digital badging as a preference in employee recruitment from a baseline of zero to a target of 25 (i.e., short-term outcome goal 2 b). However, the AWESM project team has developed a comprehensive strategy to gain industry support for recognizing digital badges as legitimate credentials in hiring processes. These efforts emphasize collaboration with employers, clear communication about the value of badges, and alignment with workforce needs.

To build employer buy-in, the team has crafted a targeted employer engagement strategy, including an elevator pitch and email templates. These communications highlight that badges are developed based on KSAs identified by employers, requiring no additional work on their part. Employers are asked to verify badge relevance, endorse specific badges, and identify potential gaps between job requirements and applicants' resumes that the badges could address. The team also plans to share badge outcomes and gather continuous feedback to refine badge offerings and enhance their alignment with employer needs.

To ensure badges are visible and accessible, they will be published on platforms like Credly, increasing their reach and usability. Additionally, the project team plans to integrate badges into regional workforce pipelines by collaborating with workforce boards and local employers to address hiring needs. By combining targeted communication, employer collaboration, and widespread visibility, the AWESM team aims to establish digital badges as a valuable tool for both employers and job seekers, promoting skills-based hiring and strengthening regional talent pipelines.

Other Benefits from the AWESM Project

As previously described, interviews were conducted with consortium leads in September 2024 as part of ongoing evaluation efforts. The interviews included questions to determine - from their point of view – how participating in the AWESM grant-funded consortium has benefited students, their institution, the region, and even themselves.

Benefits to the Institution and the Region

The institutions involved in the AWESM project, along with the surrounding region, have experienced substantial benefits due to the project's emphasis on collaboration, resource sharing, and curriculum alignment. A key benefit has been the strengthened inter-institutional relationships that emerged from this collaboration. The project brought together representatives from multiple community colleges and industry partners, facilitating the sharing of resources, promising practices, and problem-solving strategies. As one interviewee noted, "It was good to make the connections with other colleges and get our faculty talking amongst each other so we're not operating in a silo." This increased collaboration has enabled a more unified regional approach to addressing workforce development needs, particularly in technical and manufacturing fields.

Aligning curricula with regional workforce needs has also been a critical benefit of the project. By working directly with industry partners through BILT sessions, institutions have ensured their programs are responsive to current job market demands. This collaboration has enabled the colleges to define and implement common KSAs required by employers, facilitating a smoother transition for students from education to employment. As one interviewee mentioned, "Benchmarking our programs with other areas and hearing from employers what they need has been a real positive experience." This alignment not only enhances students' employability but also ensures regional employers have access to a skilled workforce, supporting economic growth.

The project has also facilitated significant infrastructure development and program innovation across institutions. Several colleges used the grant funds to upgrade equipment, renovate labs, and expand their program offerings, which directly benefits both the institutions and their local economies. For example, one interviewee pointed out, "The grant helped us move our program labs forward... being able to fund some of that, we wouldn't be able to do it otherwise." These investments are expected to have a lasting impact, as they

not only support the current needs of the region but also position the institutions to better respond to future workforce demands.

Moreover, the project has raised awareness about advanced manufacturing careers and other high-demand fields within the region. By promoting these career paths and the modern, highly automated, and clean nature of these industries, the project has helped shift perceptions about manufacturing and technical careers. Consequently, more students and community members recognize the value of these career paths, which offer sustainable wages and opportunities for upward mobility. One interviewee explained, "We've been able to reimage and rebrand manufacturing as lean, clean, and highly automated... showing it as a sector that offers sustainable living wages."

Benefits to Students

The AWESM project has generated numerous benefits for students, making education more accessible, relevant, and aligned with their career goals. One of the key benefits has been the increased accessibility to education and training through initiatives like badging and CPL. These initiatives allow students to obtain credentials in a more flexible and modular format, particularly beneficial for non-traditional students who may be balancing work or family commitments. As one interviewee noted, "The badge is a way to say... I finished this machining module... and that badge is something they can show to an employer." This kind of modular credentialing provides students with immediate value in the job market, even if they cannot complete a full program of study.

The project also focused on holistic student support, recognizing that non-academic factors often play a significant role in student success. The introduction of academic achievement specialists embedded within programs provided students with direct, personalized support that addressed both academic and personal challenges. One interviewee shared that the impact of these specialists was so profound that their institution decided to continue funding these roles beyond the grant period. "The academic achievement specialist was so impactful on retention and enrollment... the college decided to keep those roles after the grant period," they stated, highlighting how such support systems can transform student experiences and outcomes.

Another significant benefit for students has been the expanded career opportunities and pathways created through enhanced apprenticeship and internship programs. By aligning educational programs more closely with industry needs and establishing more robust links between classroom learning and workplace skills, the project has enabled students to gain valuable hands-on experience that directly translates to employment. One interviewee noted, "We've been working hard to grow our apprenticeship pipeline... and this has helped us provide students with direct links to employers in high-demand fields."

The project has also increased awareness among students and the broader community about the diverse career options available in technical and manufacturing fields. This awareness is crucial in helping students make informed decisions about their futures, particularly in regions where traditional four-year college paths may not be feasible or desirable. As a result, more students are considering careers in advanced manufacturing and other technical fields, recognizing the potential for good jobs that provide economic stability and growth.

Benefits to Site Leads

Participation in the AWESM project has offered significant personal and professional benefits to the interviewees who served as site leads, deans, or coordinators within their respective institutions. Many interviewees reported enhanced professional networks as a key benefit, as the project enabled them to build connections with colleagues from other institutions and industry partners. This networking has facilitated the exchange of ideas and promising practices during the project and opened doors for future collaboration. One interviewee mentioned that being part of the project helped them "connect with other schools and other industry partners in the region," which was particularly valuable for their professional growth and integration into the regional educational landscape.

The AWESM project also provided interviewees with opportunities for leadership and skill development. Many took on roles that required them to coordinate large, multi-institutional projects, develop strategies for alignment with industry needs, and facilitate discussions among diverse stakeholders. This experience allowed them to develop key leadership skills and gain experience in project management, which will be valuable for their future career advancement. One interviewee shared, "I had to step up and take on more leadership responsibilities than I had in the past, which was both challenging and rewarding."

Personal fulfillment from seeing the positive impact of their work on students and regional workforce development was another significant benefit reported by interviewees. Many felt a deep sense of satisfaction in knowing that their efforts were contributing to meaningful changes within their institutions and communities. One participant shared a compelling story of a student who received emergency funding through the project and later returned the money after securing a job, demonstrating the tangible and immediate impact of the grant's initiatives. "The student came back to return the $500... saying he wanted it to be there for someone else when they needed it," the interviewee recalled, emphasizing the powerful and positive outcomes of the project.

Additionally, participation in the AWESM project broadened the interviewees' perspectives on regional workforce needs and the role of community colleges in addressing these needs. Several interviewees expressed a deeper understanding of the importance of regional cooperation and alignment to meet the demands of local employers. One participant noted, "The project underscored the necessity of taking more regional approaches to workforce development," highlighting how their involvement in the project has shaped their approach to future educational planning and collaboration.

Faculty and Site Lead Commitment: Key to Sustained Success

Evaluation Question:

- To what extent are faculty expressing attitudes and engaging in behaviors that demonstrate support for the project's activities and strategies?

The sustained success of the AWESM project hinges on the commitment and support of faculty and consortium site leads. These individuals play a vital role in embedding the project's strategies into institutional practices, ensuring its impact continues beyond the funding period. Their attitudes, active engagement, and advocacy for effective practices are instrumental in maintaining regional collaboration, aligning educational programs with workforce needs, and expanding opportunities for students. This alignment not only enhances immediate outcomes but also builds a foundation for the project's long-term sustainability and relevance.

Interviews with consortium leads from the AWESM project revealed a strong alignment of attitudes and behaviors that demonstrate solid support for the project's activities and strategies. Across the board, interviewees expressed a deep commitment to the project, actively engaging in its activities and advocating for the continuation and sustainability of its successful practices. Their proactive participation in various project activities—such as BILT sessions, inter-institutional meetings, and curriculum development workshops—reflects a high level of endorsement of the project's collaborative approach. This involvement extended beyond passive attendance; interviewees were actively contributing ideas, sharing resources, and engaging in decision-making processes crucial for aligning educational programs with regional workforce needs. One interviewee remarked on the value of these sessions, noting how "we were able to work through what are the most important KSAs needed in the field," underscoring their hands-on role in shaping key outcomes.

In addition to their active engagement, consortium leads indicated a strong inclination to advocate for the continuation of effective strategies initiated by the AWESM project. Many expressed a desire to see the institutionalization of roles and practices that have proven beneficial, such as the introduction of academic achievement specialists, the use of badging systems, and enhanced curriculum alignment efforts. These strategies were frequently highlighted as transformative in improving student retention, program relevance, and alignment with employer needs. As one participant described, the impact of academic achievement specialists was so significant that "the college decided to keep those roles after the grant period." This decision reflects not just a belief in the value of these roles but also a concrete action to sustain them beyond the project's funded timeline. Furthermore, interviewees frequently mentioned the importance of continuing the regional collaboration facilitated by the project. Many noted that the relationships and networks built during the AWESM project should be maintained to tackle ongoing challenges collectively. As one interviewee stated, "I hope we continue to work together even though the grant may be over... we've built a good foundation for regional cooperation." This attitude shows a commitment to the project's collaborative ethos and the belief that such cooperation is essential for long-term regional success.

Interviewees also demonstrated enthusiasm for the project's outcomes and impact, which further highlights their support for the project's activities and strategies. Many spoke positively about how the project had enhanced student support services and expanded career opportunities through initiatives such as badging and CPL. These approaches were seen as highly effective in providing students with flexible, modular credentials that are immediately valuable in the job market. One interviewee noted, "The badge is a way to say... I finished this machining module... and that badge is something they can show to an employer," reflecting their excitement about how such strategies directly benefit students. The introduction of these practices not only aligns with the project's goals of making education more accessible but also demonstrates the interviewees' alignment with these goals. Furthermore, there was widespread recognition of the institutional and regional benefits brought by the AWESM project. Improved curriculum alignment, stronger inter-institutional cooperation, and enhanced ties with local employers were frequently cited as key outcomes. One interviewee summarized this sentiment by saying, "We've been able to benchmark our programs with other colleges and learn from each other, which has been very positive." This recognition was often coupled with a proactive stance on sustaining these benefits, indicating a belief in the effectiveness of the project's strategies and a desire to see them continue.

Beyond expressing supportive attitudes, the interviewees also described specific actions and behaviors that align with the AWESM project's goals, further reinforcing their commitment to the project. Several participants

mentioned their efforts to secure additional resources or support to sustain the project's initiatives, demonstrating a forward-thinking approach to maintaining and scaling the project's impact. One interviewee shared, "We're looking at ways to keep these programs and support positions funded even after the grant ends," highlighting their proactive efforts to ensure the project's continuity. Others discussed how their institutions have already begun implementing new practices inspired by the project, such as more flexible meeting formats and enhanced credit for prior learning policies. These actions show that interviewees are not only supportive of the project's strategies but are also willing to take concrete steps to embed these strategies into their institutional practices, ensuring their long-term success.

The interviews clearly indicate that the consortium leads are highly supportive of the AWESM project's activities and strategies. Their attitudes and behaviors—ranging from proactive engagement in project activities and advocacy for sustainability to enthusiasm for positive outcomes and commitment to new practices—reflect a deep alignment with the project's goals of fostering regional collaboration, aligning education with workforce needs, and expanding opportunities for students. The feedback from the interviewees underscores the success of the AWESM project in generating not only immediate benefits but also a strong foundation for sustained impact in the future. Their expressed support and actions demonstrate a clear commitment to the project's continuation and evolution, ensuring that its benefits extend well beyond the grant period.

LESSONS LEARNED AND RECOMMENDATIONS

The AWESM project, spearheaded by a consortium of eight North Carolina community colleges, aimed to address regional workforce gaps in advanced manufacturing by aligning education and training systems with industry needs. The initiative sought to reduce fragmentation in the education-to-employment pipeline through innovative strategies, including the development of standardized curricula, digital badging, and CPL. By engaging employers in the co-creation of industry-defined KSAs, AWESM ensured that training programs were directly aligned with workforce demands. The project successfully expanded access to modular credentials, fostered regional collaboration, and provided holistic student support, ultimately strengthening the talent pipeline for sectors such as machining, mechatronics, welding, and industrial systems technology.

The following lessons learned, and recommendations are provided to guide the AWESM team as they work to sustain and expand upon the program's achievements.

Lessons Learned from Challenges and Successes

The project encountered several implementation challenges, including inconsistent engagement from industry partners, who were initially skeptical about digital badging as a credentialing tool. Staff turnover, particularly in the CPL Coordinator position, further hindered continuity and slowed progress in key areas such as credential standardization and outreach. Additionally, coordination across eight consortium colleges proved complex due to differing schedules, administrative structures, and institutional priorities. Delays in marketing and the development of a CPL webpage also limited the project's ability to reach and engage stakeholders effectively.

Despite these challenges, the project achieved significant successes. The consortium exceeded its employer engagement goals, with 118 active partners participating in BILT sessions to align educational programs with industry-defined KSAs. Regional collaboration was another highlight, fostering standardized curricula and modular credentials, such as digital badges and CPL, which provided accessible pathways for non-traditional learners. Holistic student support expanded substantially, with over 356 partnerships established to address non-academic barriers and over 500 students enrolled through WIOA-supported programs. These accomplishments illustrate the project's success in fostering sustainable improvements to workforce education systems.

Recommendations

The following recommendations focus on sustaining AWESM's impact and informing future efforts as the funding period comes to an end:

Integrate Digital Badges into Employer Practices

Efforts should focus on building stronger employer adoption of digital badges by demonstrating their value in recruitment and hiring. Targeted outreach to employers, including case studies of successful implementation and testimonials from current partners, can highlight the practical benefits of using badges to identify job-ready candidates. Workshops and informational sessions can address employer concerns about the credibility of digital credentials and provide guidance on incorporating them into job descriptions and evaluation processes. Additionally, collaborating with industry associations to promote badges as a regional standard could enhance their legitimacy and encourage widespread adoption.

Sustain Regional Networks

Maintaining the partnerships established through AWESM is crucial for long-term alignment between educational programs and workforce needs. Regular bi-annual consortium meetings can ensure continued collaboration, allow for sharing best practices, and enable adjustments to meet evolving industry demands. A regional advisory board, comprised of representatives from colleges, employers, and workforce development organizations, could provide ongoing oversight and strategic direction. By formalizing these networks, the consortium can remain a dynamic platform for innovation and responsiveness to economic shifts.

Enhance Marketing and Awareness Efforts

Increasing the visibility of CPL and digital badge opportunities is essential to sustaining and expanding student participation. Marketing efforts should include a mix of digital campaigns, such as targeted social media advertisements, email newsletters, and webinars tailored to students, employers, and educators. Highlighting success stories through videos, infographics, and testimonials can illustrate the tangible benefits of CPL and badges. A centralized, user-friendly website or portal that consolidates information about opportunities, processes, and benefits would streamline access for all stakeholders. Partnerships with community organizations and workforce boards can further amplify outreach, ensuring that the project reaches underrepresented groups and expands its impact.

By focusing on these priorities, the AWESM project can sustain its momentum and serve as a model for future initiatives, ensuring its innovations continue to benefit students, employers, and the broader community

CONCLUSONS AND LIMITATIONS

Conclusions

The AWESM project achieved its overarching goal of aligning regional education systems with workforce needs in advanced manufacturing. Key activities, including the establishment of the BILT, the development of standardized curricula, and the implementation of digital badging and CPL initiatives, produced measurable outcomes. The project demonstrated significant success in fostering collaboration among educators, employers, and students, ultimately enhancing career readiness and regional economic growth.

Sector Strategies and Employer Engagement: The BILT framework facilitated strong industry engagement, with 118 employers participating—far exceeding the target of 50. Employers actively contributed to the development of KSAs and provided critical feedback, ensuring alignment between educational programs and workforce needs. Surveys indicated high satisfaction among employers, validating the BILT model's effectiveness in shaping relevant curricula.

Enhanced Career Pathways Programs: The project developed 13 regionally standardized courses and integrated micro-credentials to streamline educational pathways. These efforts improved credit transferability across consortium colleges and equipped students with skills directly aligned with industry demands. The addition of digital badges further enhanced students' employability by providing verifiable credentials recognized by employers.

Strategic Alignment with Workforce Development Systems: The AWESM project successfully integrated holistic student support, surpassing its target by engaging over 350 public and private entities to address non-academic barriers. Workforce Innovation and Opportunity Act (WIOA) enrollment goals were significantly exceeded, with over 500 participants benefiting from targeted manufacturing programs.

Systems Change and Accelerated Learning Pathways: Digital badging initiatives advanced workforce alignment, with 59 badges developed and 710 awarded to students. Despite delays in statewide guidelines, the project laid a foundation for broader adoption and integration of digital credentials. CPL initiatives also exceeded expectations, with 51 students earning CPL and 222 credits awarded, reflecting the project's success in recognizing and leveraging prior learning.

Implications and Next Steps: The AWESM project provides a replicable model for aligning education with workforce needs through systemic collaboration, innovative credentialing, and comprehensive student support. As the project concludes, efforts should focus on sustaining employer partnerships, expanding digital badging, and addressing logistical challenges in curriculum standardization to ensure the long-term impact of these initiatives.

Limitations

Some limitations influenced the evaluation and implementation of the AWESM project, which should be considered when interpreting the findings:

Evaluation Challenges:

- **Data Collection and Analysis:** While comprehensive surveys and interviews were conducted, response rates varied across stakeholder groups, potentially introducing bias. Efforts to mitigate this included reminders and follow-up.
- **Sample Representativeness:** Employer turnover and inconsistent participation in BILT sessions as well as relatively low response rates on the instructor and student surveys might have resulted in systematically biased responses and results.

Implementation Limitations:

- **Digital Badging Adoption:** Delays in statewide guidance restricted the number of badges issued and limited employer integration of badges into hiring practices. Despite progress, this remains an area for further development.
- **Coordination Across Consortium Colleges:** Variations in institutional priorities, schedules, and administrative processes created logistical hurdles in curriculum standardization. More streamlined coordination could have accelerated implementation.
- **Participant Accessibility:** While virtual options improved accessibility for some, they could not fully address participation barriers for all stakeholders, particularly in early project phases.

Despite these limitations, the AWESM project's outcomes provide valuable insights into effective strategies for workforce alignment. Addressing these limitations in future efforts will enhance the scalability and impact of similar initiatives.

APPENDIX A – AWESM LOGIC MODEL

INPUTS			EXPECTED RESULTS		
Resources		**Strategies and Activities**	**Outputs**	**Outcomes**	**Impact**

Grant funding for personnel, vendors, and consultants
Existing employer, workforce system, community, and college partnerships
	• Proven model to engage employers (BILT)	• Adopt a BILT model
		  ◦ Create a regional Business & Industry Leadership Team (BILT) for manufacturing
		  ◦ Create local BILTs
		• Identify KSAs for machining, mechatronics/industrial systems, and welding
		  ◦ Map KSAs to curriculum courses
			• # sector employers active in regional/local BILTs
			• # colleges using BILT model
				• More regional employers active in a manufacturing BILT
				• Common KSA language
				• Machining, mechatronics/industrial systems, and welding programs aligned w/sector needs
					Regional alignment and reduced fragmentation in the education-workforce system
					
					Sustainable progress made toward WIOA Unified State Plan goals
					
					Enhanced workforce-education system makes North Carolina more prosperous

	• NCCCS *Credly* platform for digital badging, credentials
	• Workforce Development Board funding for Lean Production System (LPS)
		• Implement competency-based digital badges
		  ◦ Create digital badges
		  ◦ Colleges adopt digital badging based on KSAs and Student Learning Outcomes (SLOs) for jobs on manufacturing career pathway
		  ◦ Introduce digital badging into recruiting and hiring
		  ◦ Digital badging included in high school CTE and dual-enrollment programs in
			• # digital badges by program, occupation
			• # employers using at least one digital badge based on KSAs and SLOs
			• # individuals earning digital badges, certificates, diplomas, or degrees
			• Documentation of CTE pathways for dual-enrolled students
			• # school systems adopting digital badges
			• # of students using pathways with badges
			• # badges earned
			• student outcomes
			• # LPS team leads and section managers trained
				• More sector employers using digital badging for recruitment & hiring
				• More participants earn digital badges	

INPUTS			EXPECTED RESULTS		
Resources		**Strategies and Activities**	**Outputs**	**Outcomes**	**Impact**
		targeted programs. • Offer modularized and self-paced curriculum aligned with KSAs. • Use Lean Production System (LPS) in pre-employment as a credential option	• # LPS sessions, trainees & badges/credentials earned • # colleges using LPS for all program students		
	• NCCCS objective to incorporate Prior Learning Assessment (PLA) system-wide • NC push to identify credentials of value at local, regional, statewide levels • NC Portfolio for Life initiative	• Regionalize PLA process • Implement technology to support competency-based assessment linked to awarding PLA credit. • Implement options for students to test-out of courses in targeted programs • Implement portfolio assessment option for awarding PLA credit	• # students who seek PLA credit / # by portfolio assessment • # students awarded PLA credit/ # by portfolio assessment • # PLA credits awarded	• More participants receive PLA credit &/or postsecondary credentials • Credit awarded via PLA reflected in digital badges	

INPUTS			EXPECTED RESULTS		
Resources		**Strategies and Activities**	**Outputs**	**Outcomes**	**Impact**
	• *SkillsCommons* repository of Open Educational Resources (OER) • OER consultant	• Prepare faculty for online, tech-enabled instruction ◦ Align contextualized, technology-enabled learning with KSAs • Offer shared, virtual courses with staggered start/completion dates give new flexibility to students regionwide	• # training sessions offered to faculty • # of faculty using • # new faculty trained • # virtual, shared courses w/open labs • # courses offered nights and/ or weekends • # students enrolled in shared courses w/ open labs • # new OERs / # from faculty / # from consultant • # courses affected by OERs	• More colleges jointly enrolling students into synchronous & asynchronous courses with local labs	
	• Interwoven funding through WIOA and other sources	• Assign college intake and success coaches for WIOA-enrolled students • Use predictive analytics to flag at-risk students • Provide students with holistic support services ◦ Provide student services (e.g., career planning, academic support) virtually	• # candidates who enroll/ # candidates who enroll in targeted programs • # of enrolled candidates who receive student support services • # of students flagged as at-risk • # referred to external service providers • # WIOA-enrolled candidates who articulate credit/# of credits articulated • persistence, retention, and completion rates	• More holistic support for students • More WIOA-enrolled candidates in mfg. programs	

APPENDIX B – INTERVIEW PROTOCOL

AWESM Consortium Members Interview Protocol

Introduction

- Greeting, description of the purpose of the report, and assurances of confidentiality.

Background Information

1. First, can you describe your role at your institution and your specific responsibilities within the consortium?

Impact

1. How would you describe your own satisfaction with the meetings and activities you've engaged in through your participation in the consortium? This would include the regular meetings and the BILT sessions. Is there anything you would have done differently – any different activities or approaches that would have improved the work?

2. I what ways has your institution benefitted from participating as a consortium member?

3. In what ways has your region benefitted?

4. In your view, to what extent are the activities and strategies improving the feasibility, speed, and cost for acquiring the credentials needed for a desired job in machining, mechatronics/industrial systems technology, and welding?

5. In what ways have students benefited from the work conducted through the AWESM grant? This could be students at your own institution or in the region.

6. In what ways, if any, have you yourself benefitted

7. Through all of this – how might you say the region has benefited?

Sustainability

a. Can you share any recommendations for improving the AWESM or consortium's impact past the grant period?

Overall Experience

1. Is there anything else you want to share about your experience with the consortium that we haven't covered?

APPENDIX C - SURVEYS

AWESM BILT Survey - Intro meeting version

Thank you again for taking the time to provide your valuable input. Please take just 1-2 minutes to give us your thoughts on this process. Your responses are completely anonymous.

The purpose of today's initial session was to clarify and discuss the purpose of the BILT and the roles of its members. In your view, how effective was this session?

- ○ Very effective
- ○ Moderately effective
- ○ Only slightly effective
- ○ Not effective at all

What - if anything - would have made the session more effective?

_____

What - if any - questions do you have about the purpose of the BILT or your role in it?

_____

Did you gain any new insights - or experience any other personal benefits - from your participation in this session?

- ○ Yes
- ○ No

Describe the 1 or 2 biggest insights or benefits you gained from your participation in this session.

_____

AWESM BILT Survey - Vote meeting version

Thank you again for taking the time to provide your valuable input. Please take just 1-2 minutes to give us your thoughts on this process. Your responses are completely anonymous.

In your view, how effective was this BILT session?

- ○ Very effective
- ○ Moderately effective
- ○ Only slightly effective
- ○ Not effective at all

What - if anything - would have made the session more effective?

_____

Are you satisfied with the results from this BILT session? (i.e., the final lists of knowledge, skills, and abilities)

- ○ Yes
- ○ Somewhat
- ○ No

Could you briefly describe why you are less than satisfied with the results?

_____

Did you gain any new insights - or experience any other personal benefits - from your participation in this session?

- ○ Yes
- ○ No

Describe the 1 or 2 biggest insights or benefits you gained.

_____

Instructor Survey

Q1.1 As mentioned in the invitation, this project called Aligning the Workforce and Education System for Manufacturing (AWESM) is designed to make systems-change enhancements to education and occupational training for machinists, industrial machinery mechanics, and welders with the aim of increasing the number of workers regionally for these positions.

How clear is your understanding of this project?

- ○ Very clear
- ○ Somewhat clear
- ○ Slightly clear
- ○ Not clear at all

Q1.2 What about the project would you like to learn more about? _____

Q1.3 How clear is your understanding of your role on this project?

- ○ Very clear
- ○ Somewhat clear
- ○ Only slightly clear
- ○ Not clear at all

Q1.4 What about your role on the project would you like to learn more about? _____

Q2.1 Some faculty at the AWESM consortium schools have helped with the process mapping the KSAs identified by employers to their courses to begin development of common courses.

Have you been involved in this process?

- ○ Yes
- ○ No

Skip To: End of Block If Q2.1= No

Q2.2 In your view, how effective was the process that was used?

- ○ Very effective
- ○ Moderately effective
- ○ Only slightly effective
- ○ Not effective at all

Display This Question if Q2.2 DOES NOT =Very effective

Q2.3 What - if anything - would have made the process more effective? _____

Q2.4 Are you satisfied with the results from the process?

- Yes
- Somewhat
- No

Display This Question: if Q2.4 DOES NOT =Yes

Q2.5 Could you briefly describe why you are less than satisfied with the results? _____

Q3.1 One aim of the AWESM project is to ensure that students have access to learning options that are compatible with their own circumstances. Which of the following options does your institution offer to students?

- Evening courses
- Weekend courses
- Self-paced courses
- 8-week courses
- Multiple offerings of the same course
- Online courses
- Synchronous and online courses
- Asynchronous courses
- Other (Please describe) _____

Q3.2 Micro-credentialing is another option that the AWESM team would like to make available to students. Micro-credentials are short, focused credentials designed to provide education and training in specific knowledge and skill areas. Micro-credentials can sometimes also be stacked for a certificate or degree program.

How familiar are you with micro-credentials as an educational option for students?

- Very familiar
- Somewhat familiar
- Vaguely familiar
- Not familiar at all

Q4.1 Does your institutions use a Learning Management System (LMS) to support the delivery and management of courses? Some examples include Blackboard, Moodle, or Canvas

- Yes
- No

Display This Question: if Q4.1 = Yes

Q4.2 Which LMS does your school use?

- Blackboard
- Moodle
- Canvas
- Other _____

Q4.3 Would you be interested in learning more about how to use your LMS effectively?

- Yes
- No

Q4.4 What LMS applications would you most like to learn more about? _____

Q4.5 Open Educational Resources (OERs) are teaching, learning, and research materials intentionally created and licensed to be free for the end user to own, share, and in most cases, modify.

Which of the following best describes your use of - or familiarity with - OERs?

- I use OERs frequently
- I use OERs occasionally
- I am familiar with OERs but have never used them
- I am unfamiliar with OERs

Display This Question: if Q4.5 = I use OERs frequently OR I use OERs occasionally

Q4.6 What OERs do you use most frequently? _____

Display This Question: if Q4.5 = I am familiar with OERs but have never used them

Q4.7 Please briefly describe why you have never used OERs? _____

Q4.8 You indicated that you are not aware of OERs. How interested are you in learning more about OERs?

- Very interested
- Somewhat interested
- Slightly interested
- Not at all interested

Q5.1 Courses that map to industry-identified KSAs are being developed in Odigia – a web-based teaching and learning platform. Odigia will house the newly created content for virtual classes and digital badges that will be available for all consortium partners.

Did you participate in the development of courses in Odigia ?

- Yes
- No

Skip To: End of Block if Q5.1= No

Q5.2 You indicated that you did participate in the development of courses in Odigia. Are you able to access those course?

- Yes
- No

Q5.3 Are you familiar with the process for incorporating Odigia into your school's LMS system?

- Yes
- No

Q6.1 This next set of questions ask you about the opportunities that your college might offer for students to receive course credit for prior learning (CPL) based on their previous education or professional experiences.

Some examples include receiving credit for courses based on standardized exam scores, courses taken at another college that are considered equivalent, or credit for previous experience or credentials acquired through work or military service.

How aware are you of the various opportunities for students to receive credit for previous learning or professional experiences at your college?

- I am not aware of any options
- I am aware of just one or two options
- I am aware of several options

Display This Question if Q6.1 DOES NOT = I am not aware of any options

Q6.2 To the best of your knowledge, which of the following CPL options does your school offer?

- ☐ AP exam scores
- ☐ CLEP exam scores
- ☐ Work experience
- ☐ Transfer credits from other schools
- ☐ Military experience
- ☐ CPL assessments
- ☐ Other (Please describe) _____

Display This Question: if Q6.1 = I am not aware of any options

Q6.3 For which of the following do you believe your school *should* offer CPL?

- ☐ AP exam scores
- ☐ CLEP exam scores
- ☐ Work experience
- ☐ Transfer credits from other schools
- ☐ Military experience
- ☐ CPL assessments
- ☐ Other (Please describe) _____

Q6.4 How familiar are you with the current processes for awarding CPL? This might include things such as providing transcripts, completing forms, or taking proficiency exams?

- Very familiar
- Somewhat familiar
- Only slightly familiar
- Not at all familiar

Display This Question if Q6.4 DOES NOT = Very familiar

Q6.5 Would you be interested in learning more about the process your school uses for CPL?

- Yes
- No

Display This Question: if Q6.4 = Very familiar

Q6.6 Would you be willing to provide guidance to students at your school who are interested in CPL opportunities?

- Definitely yes
- Definitely not
- Probably not
- Might or might not
- Probably yes

Display This Question: DOES NOT = Not familiar at all

Q6.7 How satisfied are you with the current processes for awarding CPL? This might include things such as providing transcripts, completing forms, or taking proficiency exams?

- Very dissatisfied
- Somewhat dissatisfied
- Neither satisfied nor dissatisfied
- Somewhat satisfied
- Very satisfied
- Can't rate

Display This Question: if Q6.7 = Very dissatisfied OR Somewhat dissatisfied OR Somewhat satisfied

Q6.8 What about the process should be improved? _____

Display This Question: if Q6.7 = Very satisfied

Q6.9 What in particular did you like about the process? _____

Q6.10 A primary objective of the AWESM initiative is to establish a standard method for obtaining CPL across all member institutions within the consortium. After developing this procedure, we hope that educators like you would be open to promoting awareness among students by sharing information and engaging in conversations about CPL. Would you be willing to do this?

- Yes
- Maybe
- No

Q6.11 What - if any - other ideas do you have for raising awareness of CPL opportunities among students?

_____

Q7.1 To the best of your knowledge, are opportunities for CPL accessible to all students or is there a disparity? The disparity could be based on a number of factors including race, socio-economic background, etc)

- I believe CPL opportunities are equally accessible to all students
- I believe there is a disparity
- I am uncertain

Q7.2 What - in your view - are the key factors and/or barriers that make CPL more accessible to some students than others? _____

Q8.1 One of the keys to sustaining the efforts of this project is to encourage and help to sustain connections between educators and employers. Do you currently have connections with employers that help to inform what you teach and how you teach?

- Yes
- No

Display This Question if Q8.1 = Yes

Q8.2 Could you briefly describe the one or two employers you are connected with, how you were able to connect with them, and the benefits you have experienced through those connections? _____

Q8.3 Externships are an effective way for faculty to establish connections with employers. Externships are work-based learning and professional development opportunities that provide teachers extended exposure to work environments and the types of careers their students may pursue.

Have you participated in an externship?

- Yes
- No

Display This Question if Q8.3 = Yes

Q8.4 Please briefly describe the externship and the benefit(s) you experienced. _____

Display This Question if Q8.3 = No

Q8.5 How interested are you in an externship opportunity?

- Very interested
- Somewhat interested
- Only slightly interested
- Not at all interested

Display This Question if Q8.5 = Not at all interested

Q8.6 Could you briefly describe why you are not at all interested in an externship? _____

Display This Question if Q8.5 DOES NOT = Not at all interested

Q8.7 We understand that there are potential barriers to faculty taking advantage of externship opportunities such as time and financial factors. What would you need - or what could be done - to better ensure that could do an externship if you wanted? _____

Display This Question if Q8.1 = No

Q8.8 Other than externships what are some other ways for educators to establish and maintain connections with employers? _____

Student Survey

Q1.1 Thanks for taking a few minutes to complete this additional anonymous survey which includes questions about the academic and non-academic support services being offered at your college and some questions about opportunities you might have for receiving credit for prior learning based on your prior educational or professional experiences.

Q1.2 Which college do you attend?

- ○ Alamance Community College
- ○ Davidson-Davie Community College
- ○ Forsyth Technical Community College
- ○ Guilford Technical Community College
- ○ Montgomery Community College
- ○ Randolph Community College
- ○ Rockingham Community College
- ○ Surry Community College
- ○ Other _____

Q2.1 This first set of questions asks you about the academic support services at your college. These services include such things as application/admissions support, technology support, financial aid counseling, tutoring services, academic counseling, and career services.

Have you used any of the academic support services offered at your college?

- ○ Yes
- ○ No

Display This Question: If Q2.1 = Yes

Q2.2 Overall, how satisfied are you with the academic support services provided at your college?

- ○ Very dissatisfied
- ○ Moderately dissatisfied
- ○ Neither satisfied nor dissatisfied
- ○ Moderately satisfied
- ○ Very satisfied

Display This Question: If Q2.1 = Yes

Q2.3 Have you used the academic/career advising services offered at your college?

- ○ Yes
- ○ No

Display This Question: If Q2.3 = Yes

Q2.4 How satisfied were you with the interactions you had during your advising session(s)?

- Very dissatisfied
- Moderately dissatisfied
- Neither satisfied nor dissatisfied
- Moderately satisfied
- Very satisfied

Display This Question: If Q2.3 = Yes

Q2.5 How satisfied were you with the results of the advising you received?

- Very dissatisfied
- Moderately dissatisfied
- Neither satisfied nor dissatisfied
- Moderately satisfied
- Very satisfied

Q2.6 Are you aware that your college offers academic support services with an online or phone option for requesting services?

- Yes
- No

Q2.7 Can you think of any academic services that your college currently does not offer, but you wish they did?

- Yes
- No

Display This Question: If Q2.7 = Yes

Q2.8 What additional academic service(s) do you wish your college offered? _____

Q3.1 This next set of questions asks you about non-academic support services at your college. Non-academic support services might include such things as direct assistance with daycare, transportation, and access to technology (e.g., computer labs). It might also include indirect assistance through referrals to such things as medical/mental health services or legal assistance.

Have you used any of the non-academic support services offered at your college?

- Yes
- No

Display This Question: If Q3.1= Yes

Q3.2 Overall, how satisfied are you with the non-academic support services provided by your college?

- ○ Very dissatisfied
- ○ Moderately dissatisfied
- ○ Neither satisfied nor dissatisfied
- ○ Moderately satisfied
- ○ Very satisfied

Display This Question: If Q3.2 = Very OR Moderately dissatisfied

Q3.3 What are you particularly dissatisfied with regarding your college's non-academic support services?

_____

Display This Question: If Q3.2 = Very OR Moderately satisfied

Q3.4 What about your college's non-academic support services are you particularly satisfied with?

_____

Q3.5 Are you aware that your college offers non-academic support services with an online or phone option for requesting services?

- ○ Yes
- ○ No

Q3.6 Can you think of any non-academic services that your college currently does not offer, but you wish they did?

- ○ Yes
- ○ No

Display This Question: If Q3.6 = Yes

Q3.7 What additional non-academic service(s) do you wish your college offered? _____

This final set of questions ask you about the opportunities that your college might offer to receive college credit based on your prior learning or experiences. Some examples include receiving credit for courses based on standardized exam scores, courses taken at another college that are considered equivalent, proficiency exam scores, or credentials acquired through work or military service.

Q4.1 How aware are you of the various opportunities for students to receive credit for prior learning or experiences?

- ○ I am not aware of any options
- ○ I am aware of just one or two options
- ○ I am aware of several options

Display This Question: If Q4.1 DOES NOT = I am not aware of any options

Q4.2 You indicated that you are aware of at least one or two opportunities for students to receive credit for prior learning or experiences. Have you taken advantage of any options at your college?

- Yes
- No

Display This Question: If Q4.2 = No

Q4.3 Can you briefly describe why you have not yet sought to receive credit for prior learning or experiences at your college? _____

Display This Question: if Q4.1 = I am not aware of any options OR Q4.2 = No

Q4.4 How interested are you in seeking college credit for your prior learning or experiences?

- Not at all interested
- Only slightly interested
- Moderately interested
- Very interested

Display This Question: if Q4.4 DOES NOT = Not at all interested

Q4.5 What - if anything - might prevent you from taking advantage of opportunities to receive credit for prior learning or experiences? _____

Display This Question: If Q4.2 = Yes

Q4.6 How satisfied were you with the process for receiving credit? This might include things such as providing transcripts, completing forms, or taking proficiency exams?

- Very dissatisfied
- Somewhat dissatisfied
- Neither satisfied nor dissatisfied
- Somewhat satisfied
- Very satisfied

Display This Question: if Q4.6 DOES NOT = Very satisfied

Q4.7 What about the process for receiving credit should be improved? _____

Display This Question: if Q4.6 = Very satisfied

Q4.8 What in particular did you like about the process for receiving credit? _____

Display This Question: if Q4.4 = Not at all interested

Q4.9 Why are you not interested in seeking college credit for prior learning or experiences? _____

Q5.1 The AWESM team is working to make educational badges available to students. Badges are short, focused credentials that can be combined into industry-recognized micro-credentials or applied as credit for prior learning for an academic certificate or degree. Badges could be earned remotely and on your own time.

How interested would you be in earning educational badges?

- ○ Not at all interested
- ○ Only slightly interested
- ○ Moderately interested
- ○ Very interested
- ○ Unsure

APPENDIX D – INDUSTRY-RECOGNIZED BADGES ISSUED

	Badges	# of Students Issued
DDCC	MEC 130 – NIMS Basic Mechanical certification	23
	MNT 240 – NIMS Maintenance Operations certifications	11
	ELC 117 -- NIMS Electrical Systems	20
	ATR 211 – Fanuc Robotics Certification (through Fanuc America)	10
	MAC 142 – NIMS Manual Mill and Lathe	32
	MAC 143 – NIMS Level 1 Grinding	12
	MAC 122 – NIMS Level 1 CNC Lathe	12
	MAC 124 – NIMS Level 1 CNC Mill	12
	MAC 222 – NIMS Level 2 CNC Lathe	10
	MAC 224 – NIMS Level 2 CNC Mill	10
Q1	ISC 112 – OSHA 10	55
	NIMS Basic Mechanical certification	23
	NIMS Maintenance Operations certifications	11
	Fanuc Robotics	9
	NIMS Manual Mill and Lathe	32
	NIMS Level 1 Grinding	12
	NIMS Level 1 CNC Lathe	12
	NIMS Level 1 CNC Mill	12
	NIMS Level 2 CNC Lathe	10
	NIMS Level 2 CNC Mill	10
	OSHA 10	57
Q2	NIMS Electrical Systems	20
FTCC	Lean Six Sigma Yellow Belt	14
	OSHA 10	14
Q3	Production Technician Program	14
GTCC	NIMS (Job Planning, Benchwork, and Layout)	3
Q2	NIMS (CNC Mill Operations)	3
RCC	Basic Programming & Training	3
Q2	Robots for Pick and Place Applications	3
RKCC	Introduction Flux-Cored Arc Welding (FCAW)	10
	Fundamentals of Mechanical Systems - 2021	9
	Introduction Gas Metal Arc Welding (GMAW)	9
	Fundamentals of Industry 4.0	8

	Fundamentals of PLCs - Allen-Bradley	8
	Fundamentals of Electricity - DC	7
	Fundamentals of Electricity - AC	7
	Welding Safety	6
	Fundamentals of Robotics	5
Q1	Applied PLCs - Allen-Bradley	2
	Basic Welding Print Reading	13
	Introduction Flux-Cored Arc Welding (FCAW)	12
	Introduction Gas Metal Arc Welding (GMAW)	12
	Introduction Gas Tungsten Arc Welding (GTAW)	36
	Fundamentals of Electricity - DC	7
	Applied PLCs - Allen-Bradley	5
	Applied Mechanical Systems - 2021	8
Q2	Applied Industrial Motor Controls	1
	Applied Motor Controls	1
	Applied PLC-Allen Bradley	6
	Applied PLC- Siemens	5
	Fundamentals of Electricity-AC	11
	Fundamentals of Fluid Power-Hydraulics	11
	Fundamentals of PLCs-Allen Bradley	6
	Fundamentals of Sensor Technology	6
	Introduction to Mechatronics	7
	Three Phase Testing (Greenlee)	4
	Advanced Gas Tungsten Arc Welding	7
	Introduction to Flux-Cored Arc Welding	7
Q3	Introduction to Gas Metal Arc Welding	5
	Total:	710

APPENDIX E – AWESM CONSORTIUM-SPONSORED BADGES

MACHINING BADGES

1	Print Reading	Understands engineering drawings and recognizes basic GD&T symbols. It provides a starting point for learning how to translate designs into machining instructions.
2	Programming	Understands programming languages such as G-code and M-code, which are used to control CNC machines.
3	CNC Machining Setup and Operation	Possesses an introductory understanding of CNC machine setup, such as loading materials, installing cutting tools, and configuring. This badge provides essential skills to begin translating blueprint requirements into machining actions in a manufacturing setting.
4	Confirming tooling Selection	Capable of reading tool sheets to confirm they have the right tools, understanding tooling and insert characteristics and applications, and ensuring that tools are correctly matched
5	Drilling Operation	Competent in basic drilling operations, such as twist drilling, counterboring, countersinking, and reaming. This includes selecting appropriate drills and understanding fundamental chip evacuation methods.
6	Turning Operation	Basic understanding of turning operations on lathes, including external turning, internal turning, and facing. This involves fundamental knowledge of tool selection, work holding methods, and basic strategies for achieving required tolerances and surface finishes.
7	Metrology	Basic application of hand metrology tools and techniques for measuring and inspecting machined parts to ensure they meet dimensional and geometric specifications.
8	Multiple-Axis machining	Capable of programming and operating multi axes (4th and 5th) CNC machines. This involves understanding complex toolpath generation, machine, and optimization for part geometries.
9	Machine Safety-Lock Out & Tag Out	Adheres to safety protocols and regulations to minimize the risk of accidents or injuries in the machining environment.
10	CNC Milling Operation	Possesses basic understanding of CNC milling techniques, including face milling, end milling, profile milling, and pocket milling. It includes exposure to CNC-specific tool selection, programming cutting parameters, and

		optimizing strategies to achieve precise surface finishes and dimensional accuracy in automated milling processes.
11	Manual Milling Operation	Possesses basic understanding of manual milling techniques, including face milling, end milling, profile milling, and pocket milling. It covers essential skills in tool selection, cutting parameters (such as speed, feed, and depth of cut), and strategies for achieving desired surface finishes and dimensional accuracy using manual milling machines.
12	Boring Head	Basic understanding of using a boring head to accurately enlarge holes on a workpiece, ensuring precision and alignment in manual machining operations.
13	Clamping	Ability to securely and safely clamp or fixture workpieces on manual milling machines, preventing movement during machining to achieve accurate cuts and maintain operator safety.
14	Face Milling	Ability to use face milling techniques on manual milling machines to cut flat surfaces on a workpiece, creating smooth surfaces or reducing material thickness.
15	End Milling	Ability to use end milling techniques on manual milling machines to produce slots, pockets, and contours in a workpiece, allowing for detailed and complex shapes.
16	Profile Milling	Ability to perform profile milling on manual milling machines to cut the outer edges or contours of a workpiece, creating shapes that follow the specified outline of a part.
17	Pocket Milling	Ability to perform pocket milling on manual milling machines to remove material within a defined boundary on the surface of a workpiece, creating cavities, recesses, or pockets with specified depth and dimensions.

MECHATRONICS BADGES

1	Sensor Integration	Demonstrates basic knowledge of using sensors in mechatronic systems, this badge signifies the ability to set up and use basic sensors for simple monitoring and control of mechatronic devices.
2	Actuator Design and Control	Understands how to design and use actuators, which are parts of machines that make things move. It shows that they can put together different types of actuators like motors and fluid power systems (including hydraulics and pneumatics) and create instructions to make sure the machine works correctly and smoothly.

3	Robotics Fundamentals	Understands the basic ideas and uses of robots in machines. It shows that they know how robots work, how to design them, and how to put together the mechanical parts, electrical parts, and computer instructions to make robots that work well.
4	PLC (Programmable Logic Controller) Programming	Basic knowledge of PLC programming, including ladder logic. It signifies the ability to understand and work with different types of PLCs, develop simple control solutions, and interpret basic ladder logic diagrams for applications in automation and control systems.
5	Motion Control Systems	Basic understanding on motion control system movement in machines. It shows that they can use mechanical parts, electrical parts, and computer programs to make sure machines move.
6	Hydraulic and Pneumatic Systems	Demonstrates knowledge and skill in designing, building, and maintaining systems that use fluid power in smart machines and robots, utilizing liquids and gasses to control movement precisely in automated equipment and factory machinery
7	Mechatronic System Modeling and Simulation	Demonstrates basic understanding the creation of virtual models of smart machines and robots, using computer simulations to design, test, and improve complex mechanical and electronic systems, predicting performance and enhancing functionality in real-world situations.
8	Machine Vision Systems	Understands the creation and enhancement of computer vision systems for smart machines and robots by using cameras and image analysis software to automate tasks, ensure product quality, and guide robots in factory and industrial environments.
9	Industrial Automation Systems	Demonstrates knowledge in the design and management of automation systems, including fixed, flexible, programmable, and integrated automation.
10	IoT (Internet of Things) Integration	Demonstrates the ability to use internet-connected sensors and devices to enhance machine performance, making systems smarter and more automated through improved monitoring and control.
11	Signal Processing and Conditioning	Demonstrates a basic understanding of signal interpretation in industrial systems, indicating knowledge of sensors and instruments to ensure accurate and useful information for monitoring and controlling industrial processes.

INDUSTRIAL SYSTEMS TECHNOLOGIES (IST) BADGES

1	PLC (Programmable Logic Controller) Programming	Demonstrates competence in the creation, setup, and troubleshooting of automated control systems (PLCs).
2	SCADA (Supervisory Control and Data Acquisition) systems	Understand the basics of managing SCADA systems for industrial operations with this recognition. It highlights elementary skills in monitoring, controlling, and improving processes in various industrial settings.
3	Process control and Instrumentation	Recognizes understanding of managing systems for industrial operations, highlighting foundational skills in using instruments and sensors to ensure efficient and safe operation.
4	Data Analytics and Visualization for Industrial Applications	Demonstrates basic understanding of data to enhance industrial operations by gathering information, identifying useful patterns, and creating visual displays to support smarter decision-making and improve operational efficiency in factory and industrial settings.
5	Energy Management Systems	Understands the design and improvement of energy management systems in factories and industrial sites, using advanced methods and technologies to enhance energy efficiency, reduce costs, and promote environmentally friendly practices across various industries.
6	Industrial Safety Systems and Standards	Demonstrates competence in maintaining safety by setting up and managing safety systems, using advanced safety technologies, and following best practices to protect workers and equipment while ensuring compliance with all required safety regulations.
7	Preventive and Predictive Maintenance Techniques	Demonstrates proficiency in maintaining industrial systems and equipment through the use of preventive and predictive maintenance methods, ensuring smooth operation, reducing unexpected breakdowns, and lowering maintenance costs.
8	Lean Manufacturing Principles	Use Lean manufacturing principles to boost efficiency, reduce waste, and increase productivity in manufacturing.
9	Six Sigma Methodologies	Uses Six Sigma methods to enhance processes, improve quality, and boost efficiency in industrial systems by analyzing and optimizing processes, reducing defects, and making data-driven improvements.
10	CAD/CAM for Industrial Applications	Understand how to use CAD and CAM technologies, such as SolidWorks, for designing mechatronic systems, creating integrated schematics, and wiring diagrams, with a focus on enhancing design

		processes, manufacturing workflows, and production efficiency in industrial applications.
11	CNC (Computer Numerical Control) Programming	Understand CNC machines programming processes to create precise parts and components, including developing, optimizing, and troubleshooting CNC programs, as well as understanding CNC machine operation and control.
12	Industrial Hydraulics and Pneumatics	Understands basic components of design, implementation, and maintenance of hydraulic and pneumatic systems in industrial settings to improve system performance, reliability, and efficiency.
13	Motor Control and Drives	Understand motor control systems and drive technologies with this badge, emphasizing essential skills to enhance performance, efficiency, and reliability in industrial applications.
14	Industrial Sensors and Actuators	Understand how to select, implement, and manage sensors and actuators in industrial systems with this badge, highlighting essential skills for monitoring, controlling, and automating processes to ensure accuracy, reliability, and efficiency.

WELDING BADGES

1	Foundational Welding Techniques	Capable of demonstrating fundamental welding methods, including proper use of equipment and basic joint types.
2	FCAW (Flux-Core Arc Welding)	Ability to use Flux-Core Arc Welding (FCAW), a semi-automatic arc welding process using a tubular wire filled with flux, to industry standard specifications. This certification covers single-shielded FCAW techniques and adheres to AWS and ASME standards for welder technicians.
3	Welding Safety Practices	Understanding and application of essential safety protocols to prevent injuries and ensure a safe working environment.
4	Welding Machine Operation:	Basic welding knowledge (in FCAW, GMAW, SMAW, GTAW) in setting up welding machines, including adjustments for different materials and techniques.
5	Welding Blueprints and Symbols Reading	Ability to read and interpret welding blueprints, schematics, and symbols to execute precise welds as per specifications.
6	Welding Metallurgy:	Knowledge of the properties and behaviors of different metals and alloys during the welding process.

7	Metal Fabrication	Ability to perform basic metal fabrication techniques, including cutting, bending, shaping, and assembling metal materials. This certification covers fundamental skills in drilling, tapping, and threading, as well as basic knowledge of angling and forging processes.
8	Welding Automation and Robotics:	Knowledge in operating and programming welding robots and automated systems for high-volume production.
9	GMAW(Gas Metal Arc Welding)	Displays a general understanding of fundamental applications in the use of the GMAW welding process to join metals, including a range of common transfer methods.
10	Spray Arc:	Skilled in the spray arc welding technique, using a continuous, high-energy arc to create a spray of molten metal for high-quality, fast welding of thicker materials with minimal spatter.
11	Mode of Transfer (GMAW-S, Short Circuit):	Demonstrates basic knowledge and understanding in the use of the GMAW-S (short circuit) welding process in low alloy steel, where the electrode wire contacts the workpiece, creating a short circuit to melt and transfer metal droplets, suitable for welding thin materials with reduced spatter.
12	Globular Transfer	Skilled in globular transfer welding, a mode of Gas Metal Arc Welding (GMAW) where larger droplets of molten metal are transferred across the arc, typically used for welding thicker materials with higher deposition rates and increased spatter.

APPENDIX F – AUTHOR BIOGRAPHIES

Mike FitzGerald, Ph.D., has extensive experience developing and applying quantitative and qualitative methods to assess and evaluate programs and initiatives. At The Rucks Group, Dr. FitzGerald is responsible for working on several of the firm's large and complex evaluation initiatives that require innovative solutions and technical assistance to implement successfully. Prior to joining the firm, he spent 15 years at the Cincinnati Children's Hospital Medical Center as a field service associate professor. He managed multiple concurrent evaluation projects for a range of purposes including individual performance evaluation, program evaluation, curriculum design, and organizational development. Dr. FitzGerald is a member of AEA and OPEG. Dr. FitzGerald completed his doctorate in social psychology at the University of Cincinnati and earned his bachelor's degree in psychology at Miami University.

Jennifer Billman, Ph.D., has nearly three decades of experience in higher education and brings deep knowledge and understanding of science education, evaluation, and institutional leadership to her work. Dr. Billman's diverse professional experiences at private 4-year institutions and community colleges, coupled with her research in the natural and social sciences, provide her with a nuanced understanding of the challenges confronting institutions of higher education and inform her commitment to collaborative evaluation approaches. Dr. Billman is a member of the African Evaluation Association (AfrEA) and the American Evaluation Association (AEA) where she leads the AEA Theories of Evaluation Topical Interest Group Dr. Billman holds a Ph.D. in Administration and Leadership Studies with a research emphasis on program evaluation from the Indiana University of Pennsylvania, an M.S. in Zoology from the University of Maryland, and a B.S. in Biology from Messiah College.

Alyssa Hokky, P.S.M., joined The Rucks Group in April 2021 with over four years of experience in STEM fieldwork and three years of experience in informal STEM education. Prior to joining the firm, she worked within various nonprofit and government agencies to aid in grant-funded project execution, database management, and data analyses. At The Rucks Group, she utilizes her skills to provide meaningful evaluative services through evaluation planning, reporting, data collection and management, statistical analyses, and ongoing collaborations with clients and project partners. Ms. Hokky earned a professional science master's degree at the University of Wisconsin-Stout and a bachelor's degree in zoology with a minor in psychology from Ohio Wesleyan University.

Lana Rucks, Ph.D., has over 20 years of professional knowledge and experience in the design, research, and implementation of evaluation programs. She has worked with higher education and workforce development institutions on grants funded by federal agencies, including the U.S. Department of Agriculture, U.S. Department of Education, U.S. Department of Labor, and National Science Foundation. he has taught at the University of Dayton, Wright State University's School of Professional Psychology, and Sinclair Community College. Dr. Rucks is a member of the American Evaluation Association and Ohio Program Evaluators' Group, where she served as president. Dr. Rucks earned her doctorate and a master's degree in social psychology with a concentration in Quantitative Methods from The Ohio State University. She also received a master's degree in Experimental Psychology from the University of Dayton. While at Ohio Wesleyan University, Dr. Rucks completed a Bachelor of Arts degree in psychology with a concentration in chemistry.