Alpena Community College
TAACCCT Round 4 Grant Evaluation
Final Report

Report to:
Dawn Stone
Director of TAACCCT Grant
September 24, 2018

Hezel
ASSOCIATES

Hezel Associates, LLC, is a custom research, evaluation, and strategic consulting firm specializing in education. Since 1987, Hezel Associates has embraced its mission to serve clients with *intelligence, experience, and insight to enable them to succeed in creating, managing, and improving education initiatives.*

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EXECUTIVE SUMMARY

In 2014, Alpena Community College (ACC) received a Round 4 Trade Adjustment Assistance Community College and Career Training (TAACCCT) grant from the U.S. Department of Labor. Through this funding, ACC created the *Building Career Pathways in the STEM Cluster: Closing the Skill Gaps in Northeast Michigan* project, which aspired to increase institutional capacity to provide training in four high-growth, high-demand STEM industries: advanced manufacturing, aerospace, cybersecurity, and green energy/smart grid technology.

Program Description

For this grant, ACC established two priorities: (a) build programs that meet industry needs, including developing career pathways, and (b) strengthen online and technology-enabled learning. For the aerospace sector, ACC implemented an Unmanned Aerial Vehicle (UAV) seminar, which was initially designed to be an introduction to the industry. This seminar was later aligned with the recently released Federal Aviation Administration (FAA) regulations and was delivered as a pilot prep course in which students train to become FAA-licensed UAV pilots. In cybersecurity, ACC implemented a program to prepare students for three industry certifications: Certified Information Systems Security Officer (CISSO), Certified Professional Ethical Hacker (CPEH), and Certified Penetration Testing Engineer (CPTE). To address green energy/smart grid technology industry needs, ACC implemented a Green Building, Manufacturing, Sustainability and Builders Continued Competency Training program, which later became the Green Energy/Continuing Education Seminar for Builders program. Lastly, ACC implemented a series of advanced manufacturing boot camps in which students were introduced to a variety of manufacturing fields and related job readiness skills. They also utilized grant funds to improve existing manufacturing programs at ACC (Industrial Technology and Welding) by updating lab space and procuring new equipment.

Evaluation Design

Hezel Associates served as the external evaluator for the 4-year grant, assessing the implementation and outcomes of activities. Throughout the grant period, evaluators provided ACC with formative feedback designed to support program improvements, as well as summative feedback on the outcomes of the project. The evaluation team conducted a mixed methods evaluation, utilizing a combination of qualitative and quantitative methods to develop a comprehensive understanding of the implementation and outcomes of the project. Data were collected through a review of project documents, interviews with program staff and industry partners, focus groups with program participants, and a program participant questionnaire. Questions used to guide the evaluation are as follows:

1. How was the particular curriculum selected, used, or created?
2. How was the program managed and implemented?
3. Did the grantees assess participants' abilities, skills, and interests to select participants into the grant program?
4. What contributions did each of the partners make in terms of (a) program design, (b) curriculum development, (c) recruitment, (d) training, (e) placement, (f) program management, (g) leveraging of resources, and (h) commitment to program sustainability?
5. To what extent did the project increase the attainment of certifications, certificates, diplomas, or other recognized credentials?
6. To what extent did project activities increase student retention rates for Trade Adjustment Assistance (TAA)-eligible workers and other adults?

7. To what extent did the project improve employment outcomes (e.g., hiring, wage increases)?
8. To what extent did project activities result in desired student perceptions?

Findings
The evaluation uncovered the following findings:

- The grant was managed effectively, under the leadership of the Project Director.
- Industry partner input was a key factor in development of curricula and program design.
- Students in all new programs and courses found their instructors to be helpful.
- There was little evidence that the second grant priority, strengthening online and technology-enabled learning, was met.
- Welding equipment was updated, but older machines and tools were retained so students can learn on both, as employers' needs differ.
- Students appreciated learning on new welding equipment, particularly the welding robot.
- Welding students indicated that they would like to stay in Alpena once they complete their program, but believe they can earn higher wages elsewhere.
- Active involvement of advanced manufacturing employers in the boot camps was a benefit to students, as companies provided job preparation assistance (e.g., mock interviewing, job searching) and insight into the work environment.
- The UAV curriculum incorporates the ability to obtain an FAA pilot license for UAV commercial operation.
- UAV training has been added to existing programs, such as Utility Technology, in addition to the stand-alone course.
- UAV students would like more hands-on practice during the course.
- The cybersecurity program successfully integrated industry certifications into the coursework.
- Students would have liked a "refresher" on the use of virtual machines prior to the start of the cybersecurity program, in order to begin at the appropriate level.
- Green energy seminar participants provided positive feedback on their experience, citing a knowledgeable instructor and opportunities to network with others.

Overall, ACC was successful in addressing the immediate needs of four distinct industries in the region, giving their students advantages in the form of new, in-demand skills that will likely help them find and retain a job or advance their careers. Stakeholders (employers, staff and faculty, and students) expressed appreciation for these new courses and programs, recognizing their importance to the local workforce.

Hezel Associates offers the following recommendations to ACC for program improvement and sustainability:

- Maintain momentum on cultivating new employer partnerships, as well as sustaining existing relationships.
- Consider other ways to leverage employer partnerships that will benefit students, such as mentoring programs or internships.
- Create a way to offer students more UAV hands-on practice, such as a student group or club, led by an instructor or external partner.
- Determine a mechanism to help students begin the cybersecurity program at the same level in terms of virtual machine use.

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INTRODUCTION

Alpena Community College's (ACC) Trade Adjustment Assistance Community College and Career Training (TAACCCT) Round 4 project builds on lessons learned from a prior TAACCCT program (Round 1) in which ACC implemented a successful 8-week intensive gas energy boot camp. The success of the Round 1 program was attributed to effective collaboration among ACC, local industry partners, TAA trainees, veterans, and the local workforce system (e.g., Michigan Works!, a local one-stop career center). Following the Round 1 project, ACC conducted a gap analysis to determine general areas of need in the region. Findings indicated a need for funding to support additional students, hire instructors with content expertise, develop additional programming, procure new equipment, and increase the college's online learning presence. ACC sought to address these needs through TAACCCT Round 4 funding.

In 2014, the U.S. Department of Labor (USDOL) funded the Round 4 *Building Career Pathways in the STEM Cluster: Closing the Skill Gaps in Northeast Michigan* project. Through this project, ACC proposed to increase their institutional capacity to provide training in four high-growth, high-demand STEM industries: advanced manufacturing, aerospace, cybersecurity, and green energy/smart grid technology. The two priorities ACC identified were to (a) build programs that meet industry needs, including developing career pathways and (b) strengthen online and technology-enabled learning.

The TAACCCT funding supported ACC's implementation of an Unmanned Aerial Vehicle (UAV) seminar. Initially, this course was designed to be an introduction to the aerospace industry. ACC later aligned the class with the recently released Federal Aviation Administration (FAA) regulations and the seminar was delivered as a pilot prep course in which students train to become FAA-licensed UAV pilots. For the cybersecurity sector, ACC implemented a program to prepare students for three industry certifications: Certified Information Systems Security Officer (CISSO), Certified Professional Ethical Hacker (CPEH), and Certified Penetration Testing Engineer (CPTE). For the green energy/smart grid technology industry, ACC implemented a Green Building, Manufacturing, Sustainability and Builders Continued Competency Training program, which later became the Green Energy/Continuing Education Seminar for Builders program. In the advanced manufacturing field, ACC implemented a series of boot camps in which students were introduced to a variety of manufacturing topics and provided training to develop job readiness skills. They also utilized grant funds to improve existing manufacturing programs at ACC (i.e., Industrial Technology, Welding) by updating lab space and procuring new equipment.

Hezel Associates served as the external evaluator for the 4-year grant, assessing the implementation and outcomes of grant activities. The evaluation aimed to address the following evaluation questions:

1. How was the particular curriculum selected, used, or created?
2. How was the program managed and implemented?
3. Did the grantees assess participants' abilities, skills, and interests to select participants into the grant program?
4. What contributions did each of the partners make in terms of (a) program design, (b) curriculum development, (c) recruitment, (d) training, (e) placement, (f) program management, (g) leveraging of resources, and (h) commitment to program sustainability?
5. To what extent did the project increase the attainment of certifications, certificates,

diplomas, or other recognized credentials?
6. To what extent did project activities increase student retention rates for Trade Adjustment Assistance (TAA)-eligible workers and other adults?
7. To what extent did the project improve employment outcomes (e.g., hiring, wage increases)?
8. To what extent did project activities result in desired student perceptions?

Document review, interviews, focus groups, and a survey were used to address the evaluation questions. Detailed methodology is included as Appendix A, and evaluation instruments are included as Appendices B–F. Hezel Associates provided formative, interim reports throughout the grant period to provide insight into areas needing improvement. This final, summative report discusses the implementation of the project over the 4-year grant period, as well as the outcomes of the project. This report includes evaluation methods, findings, conclusions, and recommendations based on the final synthesis of all evaluation data.

FINDINGS
The findings included in this report are based on data collected throughout the 4-year grant period and are presented by evaluation question.

Evaluation Question 1: Curriculum
ACC TAACCCT project staff aimed to develop curricula that were aligned with local industry needs in the areas of advanced manufacturing, aerospace, cybersecurity, and green energy. To ensure curricula incorporated the relevant technical and soft skills local employers are looking for, project staff leveraged existing partnerships and developed new relationships with local organizations in each of the target industry areas. One partner commented, "they're staying relevant, designing curriculum where there is a market need." Industry partner input was a key factor in development of curricula and program design; however, the development process varied slightly for each program. The following sections describe the curricula and program design for each program.

Advanced Manufacturing
ACC staff have participated in a manufacturing advisory committee for development of multiple manufacturing programs at the college. The committee is composed of manufacturing industry stakeholders who provide curriculum validation, input on program design, and help market the program. For the TAACCCT Round 4 grant, project staff continued to utilize the committee for input on program improvements. In particular, the committee reviewed curricula and provided input on lab design and equipment. Project staff also visited local employer sites to gather ideas for their industrial technology lab at ACC's Huron Shores campus, and to determine what equipment was needed to best align with what is being used by local employers.

Advisory committee feedback indicated that welding automation is an important skill for students who plan to pursue additional education in welding engineering. Through the grant, ACC was able to procure a welding robot and develop a curriculum to incorporate a welding automation course into the degree program. Program staff reported there were some curricular adjustments after the first implementation of the welding automation course, but they are now satisfied with the design. Moreover, project staff updated curricula to include new welding equipment, but also retained curricula that incorporates older welding equipment. That way, students have access to both new and old equipment, as some local employers still use the older

machines. Teaching students how to use both provided them with more diverse experience that can be applied to different employment settings.

In addition to technical input, industry partners informed ACC of a need for employees to have soft skills. In particular, employers are looking for candidates who possess the ability to get to work on time, have a strong work ethic, and want to grow professionally. Project staff integrated this input when designing the boot camps and incorporated professional skills, like techniques for résumé development, applying to jobs, and interviewing, into the curriculum.

Advanced manufacturing is a broad field in which students can pursue a variety of career paths. The advanced manufacturing boot camps expose students to these various pathways and introduce them to manufacturing concepts they may not be familiar with. In addition, the boot camps provide a picture of what the employment opportunities are and what skills are needed to work in those fields.

Aerospace
The UAV program instructors developed the seminar curriculum, and explained that it took a considerable amount of work initially, given that it was new material. However, once developed, it required few revisions. The course started out as an introduction to the UAV industry, with learning modules covering the history of UAV, basic technology, operations, UAVs in the workplace, basic aerodynamics, and legal operation of UAVs. The lead instructor participated in a UAV convention to learn more about the industry and inform the development of the program, and participated in 24 hours of intensive training offered through Straight Up Imaging—a company that specializes in the development of unmanned aerial systems (UAS). In addition, the instructor researched current standards and similar programs, and applied those principles to fit the Alpena region, as well as looked for ways to relate the curriculum to existing ACC programs where UAVs might be used (e.g., Utility Technology).

Once new FAA regulations were announced regarding licensing to operate UAVs commercially, program instructors incorporated these regulations into the curriculum to develop a course that prepared students to pass the FAA pilot license exam for UAV commercial operation. By obtaining this license, students are authorized to fly UAVs for commercial purposes, either independently, or with their employer.

UAV instructors also collaborated with the Michigan Unmanned Aerial System Consortium (MUASC)—a non-profit organization that provides airspace at Alpena County Regional Airport for testing and research of UAVs. MUASC is highly connected to the UAV industry and has shared input for ACC's course, particularly related to UAV skills employers are interested in. MUASC reported that they have heard positive feedback on the curriculum from individuals who have completed the program.

Cybersecurity
ACC offers a Network Administration degree program; however, local industry partners expressed a need for cybersecurity skill development in the region. The cybersecurity program developed through the TAACCCT Round 4 grant utilized curriculum from Merit Network, a community-based membership organization that provides IT services to organizations. This curriculum prepares students for three industry-recognized certifications: CISSO, CPEH, and CPTE. At the end of the program, students received their certifications through Mile2, an online,

industry-recognized provider of cybersecurity certifications. Because high quality cybersecurity training is not easily accessible in the region, program staff believe that the new cybersecurity program is valuable. Students appreciated the program, commenting, "the courses were good; they covered everything you needed to pass the test." In addition, the Director of IT at a local organization recommended the program to colleagues and received positive feedback from them regarding the content and materials.

Green Energy
The green energy seminars were designed for licensed contractors in the region, who are required to complete continuing education credits to maintain their license. The seminar is a 4-hour program and counts toward those continuing education credits. The curriculum incorporates green energy principles (bio mass fuels and photovoltaics), Michigan residential and energy codes, legal issues, and MIOSHA safety principles. Students receive a certificate verifying license renewal upon completion of the seminar.

Evaluation Question 2: Program Implementation
Project staff and employers reported positive opinions regarding the management and implementation of the program. Staff met weekly to talk about grant activities and maintain accountability for milestones they were tasked with completing. They believed project implementation was somewhat "trial and error" at the start, but indicated the programs are running smoothly now and, in general, they felt their time was spent efficiently throughout the grant. One staff member commented that the Project Director and her team were ambitious and exceeded in "…pushing and finding innovation and reaching out and satisfying not just the compliance level of the grant, but really, the spirit and intent of what the TAACCCT grant was originally derived from."

Advanced Manufacturing
For the advanced manufacturing programs, a full lab was developed and outfitted with equipment for the industrial technology program at the Huron Shores campus. A faculty member was hired to lead development of the lab. Grant funds were also used to purchase new equipment for the existing welding program, allowing students to be exposed to welding automation. The inclusion of the automation course was necessary to finalize a transfer agreement between ACC and Ferris State University for students who wish to pursue a BS in welding engineering. Staff indicated that have been able to easily install necessary software updates for the welding robot to date, and expect to continually update it in the future. According to program staff, the new advanced manufacturing equipment at ACC will be in use for a long period of time.

ACC's pre-existing welding and industrial technology programs are offered as certificate and degree programs, all of which include a combination of coursework and hands-on learning in the lab. The newly developed advanced manufacturing boot camps were offered as an intensive 5-day (40 hours total) training in which students were exposed to the manufacturing industry, participating in presentations, workshops, and local plant tours. The training includes guest presentations by local employers and job readiness training, including mock interviewing. Both ACC students and local non-ACC students, including high school students, were invited to participate in the boot camps.

Aerospace
Through grant funding, multiple drone models and accompanying software programs were purchased for UAV courses. A Mobile Command Vehicle (mobile unit) was purchased for UAV training, demonstration, and marketing purposes. The mobile unit was equipped with the necessary resources and tools to provide a hands-on learning experience for students. Students operating in the mobile unit are able to plan and monitor missions. Students outside the mobile unit are able to manipulate the controls and fly the UAVs, and video is then displayed in the mobile unit on TV monitors. The unit includes batteries and a generator, so it can be taken out into the field for an extended period of time. Industry partners believe that the purchase of this equipment was a valuable investment for training and testing.

The UAV program was led by a full-time ACC instructor. The instructor was involved from the start of the grant and met regularly, typically weekly, with other project staff to discuss the program. The UAV program was initially offered as a non-credit course and then was developed into a 3-credit course. Students in other degree programs can now participate in and receive credit for the course, learning how to integrate the technology into their industry, such as Utility Technology. The course is a combination of classroom work and hands-on practice flying UAVs and operating the mobile unit. Once students complete the course, they can take an FAA certification test (offered at FAA test sites) and receive their commercial UAV pilot license.

UAV seminar participants included students in other programs and workers from industries that are utilizing drone technology. Students in the Utility Technology program are now able take the UAS course for credit toward the degree program. Further, an employer partner allowed students to operate UAVs above their substations, providing a hands-on application of the technology in the electric utility industry. ACC staff have also recruited incumbent workers, including a group of electrical workers from California who traveled to Alpena to take the UAV course. Other local industry partners have sent linemen for trainings at ACC.

Cybersecurity
The cybersecurity program was implemented as three certification trainings, initially as non-credit and then translated into a credit-bearing program. Merit Network provided the curriculum which was delivered through their virtual environment, Merit Cyber Range. Merit Network provided instructors for the first cohort, while ACC Network Administration instructors participated in the initial training to ultimately serve as instructors for future cohorts. Students reported they liked the ACC instructors better than the Merit Network instructors, noting that some of the Merit instructors were too lenient during testing. At the end of the program, students receive their certification through Mile2. One student commented that SANS is an alternate certification provider that ACC staff may want to consider; he elaborated that employers tend to look for SANS certifications.

Green Energy
The green energy seminars were offered annually to Michigan contractors looking to earn continuing education credits to renew their builder's license. They are 4-hour seminars even though the contractors only need 3 hours of continuing education credit to fulfill the license requirement. The additional hour allows time for participants to ask questions and discuss related issues. According to project staff, seminar participants enjoyed this additional hour because it gave them the opportunity to talk with other contractors and learn from others' diverse experiences. Per project staff, students commented that they liked the instructor, a retired faculty

member from Central Michigan University, and found he was very knowledgeable of the subject matter.

Evaluation Question 3: In-depth Assessment and Student Support
TAACCCT funding was primarily utilized to improve and supplement existing programs at the college. Much of the in-take and student support services remained the same and were not specifically redesigned under the TAACCCT grant. Descriptions of in-take processes and student support services at ACC follow.

In-depth Assessments
For admittance, students in the non-credit programs reported a simple process in which they had to speak with or email the program coordinator to sign up for the course and then fill out a form. There was no assessment of skills or abilities. Students in credit programs reported taking ACCUPLACER exams, which are college placement tests that assess math and reading skills. The ACCUPLACER exam is a prerequisite for credit students and was not specific to the TAACCCT programs. Most students did not complete assessments as part of their program; however, advanced manufacturing boot camp students indicated they competed the ACT WorkKeys assessment which measures foundational skills necessary to succeed in the workplace. Further, some students who were referred through Michigan Works! were screened for the manufacturing boot camp. Other students reported participating in a pre-enrollment interview or orientation at ACC. Most interviews were conducted by ACC staff, though some were conducted by Michigan Works! staff. Moreover, some welding students reported earning college credit during high school through ACC dual enrollment, the College Access Network, or SolidWorks, which enabled them to start ahead in their program and finish more quickly.

Student Support Services
Project staff report the college has always offered career guidance and student support services, though there were no services specifically developed under TAACCCT. Most students who participated in the evaluation survey indicated they had not sought any support services; however, those who did reported they were satisfied with the services they received. Focus group participants described college-wide services available such as tutors, help with class scheduling and registration, and advisement for students who wish to transfer to a 4-year university. Many students are required to take a credit course on employability skills as well as a technical writing course that covers interviews and résumé writing. Advanced manufacturing project staff reported that most instructors spend a day on job search activities such as basic interview skills and résumé building.

One welding student indicated that the program, and the advanced manufacturing programs at ACC more broadly, could use more specialized career guidance. Advisors are available to students; however, advisors are also instructors and do not have much available time to provide career guidance to students. The advanced manufacturing industry is broad, leaving some students feeling confused about their career path. In addition to identifying a career path, students often have industry-specific questions, such as what to wear to an interview (e.g., lab appropriate clothing or formal attire). The welding student indicated the boot camp is a good first step toward providing the specific career support needed by students; however, they would like to see more thorough career guidance, possibly turning the boot camp into a full course.

Evaluation Question 4: Industry Partner Contributions

ACC has longstanding relationships with local industry partners and continued to leverage their connections for TAACCCT program development. Industry partners contributed in a number of ways, including curriculum validation, equipment and lab design recommendations, marketing the programs, and offering students employment or internships. Throughout the grant, project staff continually solicited feedback on program offerings to inform iterative development and improvement. Advisory committee meetings with partners were convened at least annually. One staff member reported "we go over everything we do, all of our courses and processes, take their input, what should we be doing differently, how can we improve." In addition, some of the partners provided materials to use in classes, such as blueprints, so students can experience resources they may be exposed to on the job. One partner commented, "creating awareness of local job opportunities and the necessary skills and education needed to work in those jobs" is the advisory committee's most important contribution.

As noted previously, ACC has a partnership with the local consortium, MUASC, which provides ACC students space to fly UAVs. The consortium also connects program staff with updates on current trends in the industry and keeps them connected to other industry leaders, such as Griffiss International Airport, an FAA designated test site, and the Northeast UAS Airspace Integration Research Alliance (NUAIR). Members of MUASC presented at ACC and shared latest trends in the industry, what the consortium does, industry policies, and the mechanics of UAVs. The consortium values their relationship with ACC, with one member commenting, "I think the partnership with the college adds creditability to the consortium and great value to the consortium. Absent that, I think our opportunities would be greatly reduced."

Furthermore, ACC also received UAV program support from employees at the local power company. Through this partnership, UAV program staff received input on how the technology can be used in this industry. The employees had previously contributed to development of ACC's Utility Technology program and continue to participate on their advisory committee. One asserted the importance of keeping up with the latest trends in technology, as well as the ability to remain flexible to respond to the needs of the local employers. They continue to have regular contact with ACC instructors and will remain on the advisory committee for the foreseeable future.

Employees from various local companies contributed to the advanced manufacturing boot camps by leading presentations and workshops that focus on job readiness skills, such as how to search for jobs, interviewing, and résumé development. Students also had the opportunity to participate in mock interviews with employers to practice interviewing techniques and receive feedback. Additionally, they provided information on career opportunities and what makes a qualified candidate in terms of skills, knowledge, and talent. Some industry partners also invited boot camp participants to take tours of their facility to give students a glimpse of the work environment. Having the local industry partners actively involved in the boot camp programming was beneficial to students, as a local employment agency indicated it will be important for students to learn about the changing manufacturing industry and be aware of what local companies are doing.

Advanced manufacturing advisory committee partners were part of discussions regarding the new Industrial Technology lab and welding equipment. One of the largest local employers visited ACC's campus to view the new welding robot and after, purchased their own similar piece of equipment. Project staff noted some students will become employees of this large

company, so having the familiarity with the equipment will be an advantage. In addition, welding instructors visited partner sites to gain more information on how the welding program can better align with industry processes and equipment.

Industry partners are happy to see the investment of educational resources in their community, noting that the region has "a lot of people that can really use the help," as Alpena is a small town with many workers possessing only a GED-level education. In particular, industry partners believe there is a substantial need for industrial training and hands-on learning. They were impressed to see students completing college with welding degrees, as welding is an industry with promising employment opportunities.

Overall, across the TAACCCT programs and courses, industry partners contributed in a variety of ways. Most partners were involved in advisory committees, while some were actively involved in the delivery of programming (e.g., serving as instructors, giving presentations, conducting mock interviews). One partner commented they would like to be part of ACC's open house and set up their own table to talk to students about employment options and what they look for in their employees. Most relationships between ACC and local industry partners have been established previously and will continue to be maintained.

Evaluation Question 5: Student Outcomes—Credentials
ACC proposed that a minimum of 300 individuals would receive training through the TAACCCT grant. Per staff interview and student data, they exceeded their enrollment numbers, with 456 unique participants enrolling in a program or course. A total of 601 degrees or certificates were earned across the TAACCCT programs, with 360 individuals earning certificates and 43 earning degrees.

Evaluation Question 6: Student Outcomes—Retention
Retention data were limited for this project. According to project staff, of the 456 total participants enrolled in a TAACCCT program or course, 365 completed, a rate of 80%. Another 115 were enrolled at grant end.

Evaluation Question 7: Student Outcomes—Employment
Students and staff indicated that the new programs and courses in advanced manufacturing, UAV, and cybersecurity have had a positive impact on employment, whether in gaining new jobs or improving skills for existing jobs. The green energy seminar was not intended to result in substantial employment outcomes other than allowing contractors to gain or renew their license; therefore, data were not collected in this regard.

Overall, the final employment numbers reported to USDOL showed that ACC was able to confirm that 43 individuals who were unemployed at enrollment gained employment upon completion (37 students were not able to be tracked; therefore, their employment status is unknown). Data also show that 156 students who were employed at the time of enrollment retained employment at completion. ACC reported that 200 students received a wage increase post-enrollment.

Advanced Manufacturing
Students in the Industrial Technology program who participated in the focus group conveyed that they had promising job prospects. One student shared, "[I] interviewed at three companies and

right off the bat they said all want me to work. One is Phoenix, and they do stuff on aircraft work. They do everything that you can imagine."

Welding students in the 2017 focus group explained that they would like to stay in Alpena, but are aware that there are higher wages elsewhere. Some planned to pursue welding on a nearby pipeline in another state to build up income for a few years. They expect to then come back to Alpena and work in a welding position that pays less, but they will have excess funds saved from the time on the pipeline to help them become established (e.g., buy a house). A few students voiced their interest in transferring to Ferris State University's Welding Engineering Technology bachelor's program, which is articulated with ACC's welding degree program.

The advanced manufacturing boot camps were also seen by students as beneficial for employment. As one focus group participant stated, "in terms of my career, [the boot camp] opens the doors to jobs that I normally would hot have applied for. And it also opened up the floodgates for opportunities not just here, but nationwide."

Aerospace
Focus group participants were optimistic about job opportunities in the UAV industry, particularly for those with the FAA license, as well as using this technology to improve work in other fields. Individuals with an FAA UAV license are able to apply this technology to current positions, start their own business, or do part-time jobs for people looking for drone assistance. Students noted that this technology can be used to take professional photographs, in tower inspections, and in search and rescue. A few students mentioned that they started a business as a result of the course, which is currently a small side job, and would like to turn it into part-time work during retirement. There are numerous job opportunities in this industry; however, because it is still fairly new, there is no established market value yet. Staff supported the students' assertions, stating "it is really subjective, but positive impact. I think when students come with the employer with that extra class or two and ability to apply those skills, and say they are a drone operator, they will be very competitive in the market…We got feedback from employers that this is something they would like to see."

Cybersecurity
According to students, the program has led them to find new jobs, gain more responsibilities in their current jobs, or start their own businesses. One student shared, "Are you asking if it helped me and my job itself? It has. In fact, it's also spurred, I have a freelance company now that I do on the side for security." For some students, it did not have a large impact on their career, but they still feel the information they learned is useful. The security skills taught are a solid foundation for the industry.

Evaluation Question 8: Student Perceptions
Evaluation data indicate students had positive perceptions of the TAACCCT programs. Students who participated in the 2016 and 2017 questionnaire responded to a series of items regarding their level of satisfaction with different aspects of the programming, as displayed in Figures 1 and 2. Across both years, most students expressed that they were satisfied to some extent with the instructors, course materials, technology-based resources, and hands-on experience (note that students who selected *Not Applicable* are not represented in the figures). In particular, the majority of students were very satisfied with their instructors, echoing feedback from the focus groups. In both years, many students selected *Not Applicable* for on-the-job training,

apprenticeships, internships, and online learning, indicating these components were not part of the program they participated in.

Figure 1. 2016 Student Program Satisfaction
Note. Data are representative of students from the UAV, cybersecurity, and advanced manufacturing programs. They do not include students from the green energy seminars.
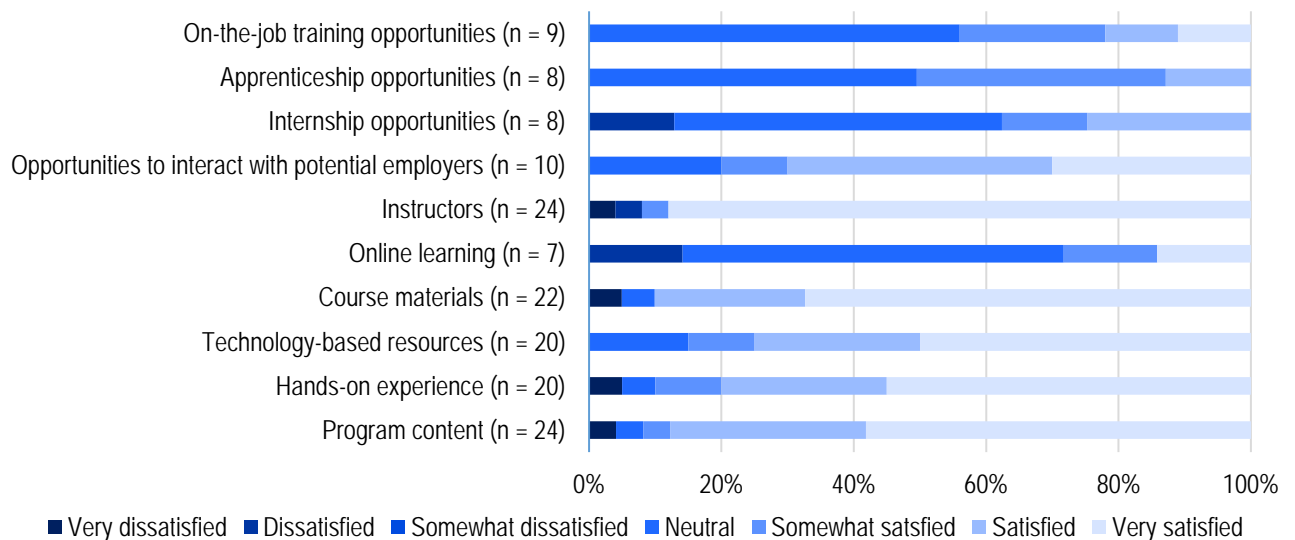

Figure 2. 2017 Student Program Satisfaction
Note. Data are representative of students from the UAV, green energy, and advanced manufacturing programs. They do not include students from the cybersecurity program.

Students from the advanced manufacturing, aerospace, and cybersecurity programs also provided feedback in focus groups in 2017 and 2018. The findings are presented below by industry. Green energy seminar participants did not participate in the focus groups.

Advanced Manufacturing
Focus group participants included students from the Industrial Technology and Welding programs, as well as the boot camps. One participant was enrolled in the welding degree program, but also participated in the boot camp to learn about other areas of advanced manufacturing. This student felt it was valuable to see what other manufacturing career paths exist, in addition to welding. The student also commented that though the boot camp included topics he learned in welding, it was beneficial to learn it through a different perspective. Another student participated in the boot camp to enhance his work on a project for his current employer. This student enrolled to learn more about the latest manufacturing technology and ultimately disseminate information on it to the local community.

Advanced manufacturing students were particularly impressed with the new equipment at both ACC campuses. Specifically, they felt training with the welding robot was beneficial, believing that this is the future of welding. While they enjoyed training with new welding equipment, they also saw the value in learning with the older machines, which remain in the labs, since they are still in use at some companies. However, one student noted that some of the older equipment is obsolete, and they will likely never use it. He had heard of another instructor selling older equipment for funds to put toward new equipment and felt that might be a good idea for some of the older welding machines. Old and new, students commented that the machines were generally well maintained. There were a few complaints, however, about maintenance and availability of some of the smaller, more basic tools and resources, noting that some of them (e.g., calipers, micrometers) need to be calibrated, and that items such as soapstone and tape measures are hard to find in the lab. In addition, welding program students indicated their workspace in the warehouse is very crowded, with little operating space. One student commented, "There's not enough room for all the stuff we have so we can't use it all effectively."

Welding students liked their instructors and felt they were "top notch." In particular, students reported that the instructors take the time to explain concepts until they grasp it. One student commented, "even when I don't get something he'll explain it and explain it until I can finally figure it out, or he'll show it to me." In addition, the instructors are proactive in asking students if they understand, and approach students as they work in the lab to make sure they are on the right track. Students found it helpful that the instructor moved around the room rather than waiting for students to ask questions. They also liked that the instructors were available outside of class time, noting "[he] is here all the time if you need help."

Aerospace
Students who participated in the UAV courses came from a variety of backgrounds; some were ACC students enrolled in other programs and others were local individuals, either employed or unemployed. They enrolled for a variety of reasons, including to learn about how to apply the technology to their current career, an interest in starting their own business, or seeking new skills while unemployed. Most students indicated they were interested in flying UAVs previously as a hobby, and with release of FAA regulations, wanted to be able to fly UAVs commercially, or have less restrictions on flying UAVs as a hobby.

Students expressed positive opinions about the instructors and felt they were knowledgeable and experienced. In particular, the instructors were thorough in their explanation of the material and students felt sufficiently prepared to pass the licensing test. The instructors effectively taught students how to operate the UAVs. In addition, students were happy with the quality of the

equipment, including both the UAVs and the mobile unit. Overall, students enjoyed their time in the program and appreciated having the opportunity locally. They commented that there are test prep courses online; however, they felt preparing solely through online coursework would be difficult. Having instructors available to help them learn the material in-person was beneficial.

Students believe that one of the biggest challenges for the UAV industry is the negative public perception of UAVs. They feel the perception will change once more people are aware of the beneficial uses of the technology in a variety of industries. One student explained the benefits of UAVs for search and rescue purposes, in which the technology is helpful for locating individuals and for training purposes. Another student explained that UAV technology can be useful to the medical field, with UAVs delivering blood to remote or high traffic areas. Other industries could benefit from UAVs by use of the technology for thermal imaging, inspection of hazardous areas, and video/imaging for marketing purposes.

Students were generally pleased with the content of the program and felt the content was sufficient to prepare them for the FAA licensing test. However, both students and staff reported they would like to have more time during the course for hands-on practice using the UAVs and mobile unit. In addition, students shared several recommendations on content that could be added to the curriculum. Their suggestions included UAV software and programming, UAV technology options (i.e., equipment available), UAV components (e.g., camera types, camera sets), and the legal aspects of flying (e.g., waiver, licensure steps). Moreover, some students are interested in using UAVs at their place of employment or for their own business. One student recommended adding course content that covers how to market oneself as a pilot; for example, how to describe this type of service and its value to the public.

Cybersecurity
Students felt the certification courses were beneficial because they provided the opportunity to learn skills that are relevant in the current IT industry. Students that were employed while enrolled reported that even though the courses did not necessarily have a substantial impact on their career, the information learned was useful and relevant to their job. One student commented,

> *There's very little reason not to have a pretty solid understanding of security. I mean, it affects almost every aspect of IT. Whether you're implementing a project or developing software. It's just, you know, a good fundamental to have and understand.*

Students were generally satisfied with the equipment but noted ongoing issues with the virtual environment. In particular, students encountered issues when they were using the virtual environment at the same time, which made it difficult to complete lab work. One student saw a benefit in these issues, however, explaining that they mimicked real situations that they will likely encounter in the workplace. Working through the technical issues helped developed their troubleshooting skills.

Similar to the other ACC TAACCCT programs, cybersecurity students had positive perceptions of the instructors, particularly the instructors from ACC. Instructors were knowledgeable and informed students of job openings when opportunities arose. Moreover, students appreciated having the program in Alpena, noting that often for these types of certifications one has to travel

out of town. Overall, students had positive perceptions of the program but offered a few recommendations for future programming. Some students would like a refresher at the start of the course on how to use virtual machines, citing that not all students were at the same level of understanding at the start of the course. Furthermore, some were interested in participating in ongoing informal training because employers will want to see that they are continually updating their knowledge of the latest trends in the rapidly-changing field; however, they were unsure of available options for continued education. Other students expressed interest in furthering their formal education in cybersecurity and would have liked to have been provided more information on options.

CONCLUSIONS AND RECOMMENDATIONS

Overall, the ACC grant team built programs that met the needs of the associated industries. Specific conclusions and recommendations for improvement and sustainability beyond the grant are as follows:

- The programs developed appear to meet targeted local and regional industry needs. Staff, employers, and students recognized that the programs and courses developed in the Round 4 grant were developed using employer input, address employer needs, and give students appropriate training for the respective workplace. Industry partnerships were critical to generating this success. It is recommended that these partnerships are well-maintained and continue to be assessed. To be effective, partnerships between colleges and companies must have frequent and regular communication, with employers providing repeated guidance on industry changes. Therefore, it is important to keep up the momentum generated in the last 4 years and maintain regular contact with all partners. Further, there may be additional ways to leverage these relationships to impact students, such as developing a mentorship program or establishing internships, depending on what aligns with each particular industry needs.

- The UAV course provides training students appreciate and can use, with the ability to obtain an FAA pilot license for UAV commercial operation. However, some would have liked more time for hands-on practice. While it may not be feasible to add more time to a short-term course, ACC could consider creating a group or club outside of the course, run by an instructor or an interested individual from MUASC, where students could have opportunities for optional practice.

- The cybersecurity program received positive feedback from students and employers, in terms of instruction, alignment to industry needs, and integration of industry certifications. However, some students felt that their skills related to the use of virtual machines needed to be at a higher level prior to the start of the program. Students recommended a refresher training before the program begins; however, if this is not feasible, ACC could also consider assessing potential students' levels related to this skill as part of the credit program screening process, with accompanying resources to point them to for refreshing their own skills. This would make it clear to students that they need to be at the appropriate level and give them materials to review before being re-assessed.

APPENDIX A: DETAILED METHODOLOGY

Hezel Associates implemented a mixed methods evaluation to conduct a formative and summative evaluation of the ACC TAACCCT Round 4 project implementation and outcomes. The evaluation was designed to answer the following questions.

1. How was the particular curriculum selected, used, or created?
    2. How was the program managed and implemented?
        2.1. How were programs and program design(s) improved or expanded using grant funds?
        2.2. What delivery methods were offered?
        2.3. What was the program administrative structure?
        2.4. What support services and other services were offered?
    3. Did the grantees assess participants' abilities, skills, and interests to select participants into the grant program?
        3.1. What assessment tools and processes were used?
        3.2. Who conducted the assessment?
        3.3. How were the assessment results used?
        3.4. Were the assessment results useful in determining the appropriate program and course sequence for participants?
        3.5. Was career guidance provided and if so, through what methods?
    4. What contributions did each of the partners (employers, workforce system, other training providers and educators, philanthropic organizations, and others as applicable) make in terms of (a) program design, (b) curriculum development, (c) recruitment, (d) training, (e) placement, (f) program management, (g) leveraging of resources, and (h) commitment to program sustainability?
        4.1. What factors contributed to partners' involvement or lack of involvement in the program?
        4.2. Which contributions from partners were most critical to the success of the grant program?
        4.3. Which contributions from partners had less of an impact?
    5. To what extent did the project increase the attainment of certifications, certificates, diplomas, or other recognized credentials?
    6. To what extent did project activities increase student retention rates for Trade Adjustment Assistance (TAA)-eligible workers and other adults?
    7. To what extent did the project improve employment outcomes (e.g., hiring, wage increases)?
    8. To what extent did project activities result in desired student perceptions?

Data Collection

Throughout the 4-year grant, Hezel Associates collected data from a variety of stakeholders using multiple methods. Each data collection method is described below.

Document Review

Hezel Associates developed the Document Review Framework to assess implementation fidelity. The framework is a matrix that outlines project activities, milestones, and deliverables stipulated in ACC's proposal to USDOL. The framework also includes space for evaluators to record the date each milestone was accomplished, the status of meeting the milestones, and the evidence provided to demonstrate meeting the milestones.

ACC shared various project-related documents with Hezel Associates over the 4-year period to demonstrate progress, including meeting minutes, outreach and promotional materials, and internal project records. As documents were received, Hezel Associates logged the title, date, and a brief description, and recorded notes in the framework describing how the documentation supported completion of or progress toward meeting the priorities. The completed Document Review Framework is included as Appendix B.

Staff Interviews
Hezel Associates developed a semi-structured Staff Interview Protocol (see Appendix C) to guide conversations with project staff. The Staff Interview Protocol contains 14 open-ended items that address organizational structure, curriculum development, program design, partner support, suggestions to strengthen the project, program sustainability, and overall impressions of the project.

There were three rounds of staff interviews throughout the project period, starting at the end of the Spring 2016 semester. Each round, the Project Director provided Hezel Associates with a contact list of individuals involved in the TAACCCT 4 project. The evaluator contacted each individual via email, describing the background of the evaluation and purpose of the interview, and asked for their availability to participate in an interview. A reminder email was sent to those who had not yet responded. Once staff responded with dates and times they were available for an interview, the evaluator sent a confirmation email with a consent document attached. Interviews were recorded with participant permission and later transcribed for analysis. Table A1 displays the number of individuals recruited for each round of interviews, as well as the number of individuals who participated.

Table A1.   Staff Interview Participation

Year	Recruited	Participated
Spring 2016	15	3
Spring 2017	14	7
Spring 2018	18	6

Employer Interviews
Hezel Associates developed a semi-structured Employer Interview Protocol (see Appendix D) to guide conversations with employer partners who participated in program development or interacted with students who enrolled in the programs. The protocol consists of 13 open-ended items covering topics such as the background of the company, their involvement with ACC, and alignment of the programs to industry needs.

Three rounds of employer interviews were conducted starting at the end of the Spring 2016 semester. For each round, the Project Director provided Hezel Associates with a contact list of local industry partners involved in the TAACCCT 4 project. The evaluator contacted each individual via email, describing the background of the evaluation and purpose of the interview, and asked for their availability to participate in an interview. A reminder email was sent to those who had not yet responded. Once the employers responded with dates and times they were available, the evaluator sent a confirmation email with a consent document attached. Interviews were recorded with participant permission and later transcribed for analysis. Table A2 displays the number of individuals recruited for each round of interviews, as well as the number of individuals who participated.

Table A2.   Employer Partner Interview Participation

Year	Recruited	Participated
Spring 2016	12	7
Spring 2017	8	4
Spring 2018	8	0

Student Questionnaire

Hezel Associates developed a 45-item questionnaire to gather student perceptions of the TAACCCT Round 4 grant-funded programs. The questionnaire contains 43 multiple choice items and 2 open ended items, covering topics such as enrollment, credentials, student support, program satisfaction, work experience, employment and wages, and demographics. The Student Questionnaire is included as Appendix E.

The questionnaire was programmed in Qualtrics, an online survey program, and administered by Hezel Associates to program participants in the Spring 2016 and 2017 semesters. Reminder emails were sent to encourage participation. There were 77 respondents in Spring 2016 and 28 in 2017.

Student Focus Groups

Hezel Associates developed a semi-structured focus group protocol to gather student perceptions of the TAACCCT Round 4 grant-funded programs. The protocol contains 10 open-ended items, covering topics such as enrollment, program experiences, equipment, and career plans. The Student Focus Group Protocol is included as Appendix F.

Hezel Associates conducted in-person focus groups in the Spring 2017 and 2018 semesters. The Project Director recruited participants, and they were grouped according to their program (i.e., aerospace, manufacturing, cybersecurity, green energy). In Spring 2017, 14 students participated and represented the aerospace, manufacturing, and cybersecurity programs. In Spring 2018, 11 students participated and represented the aerospace, manufacturing, and cybersecurity programs.

Data Analysis

Evaluators analyzed data from each data collection method separately, then summarized, compared, and synthesized findings to answer the evaluation questions. The analysis methods used for the evaluation are described in the following sections.

Document Review

Hezel Associates collected and sorted program documentation received from the Project Director, compiling a list of documents received, along with a brief description of the contents of each document. Once documents were collected and sorted, each document was compared against the Document Review Framework. Hezel Associates described document content and provided information on progress toward fulfilling milestones under *Evidence*. The dates project staff fulfilled each milestone, based on document dates, were listed under *Date*. Hezel Associates marked the status for meeting the listed milestones as (a) *met with documentary evidence*, (b) *met through self-reporting*, (c) *not met*, or (d) *in progress*.

Interviews/Focus Groups

Hezel Associates used an open-coding system that cultivated into an emergent scheme to guide interview and focus group analysis. This allowed for ideas and concepts to develop as the evaluator analyzed the data. Narrative from interview transcripts was parsed into bits of content

and fit to the emergent coding system. The evaluator identified patterns, which became themes that represented the conceptual relationships between and/or among activities and related outcomes. This recursive process systematized turning bits of information into descriptions, raising descriptions to low-level inferences, and transforming inferences into higher-level interpretations, thus allowing for conclusions to be established.

Student Questionnaire
Hezel Associates calculated descriptive statistics, including frequencies and means, of Student Questionnaire response data.

APPENDIX B: DOCUMENT REVIEW FRAMEWORK

Priority 1: Build Programs that meet industry needs. Activity 1: Partner with employers to develop four new training programs with industry-validated curricula leading to stackable credentials recognized by employers in each sector and rapid employment for trainees.					
Year	Milestones	Deliverables	Date	Status	Evidence
1 10/1/14 to 9/30/15	a. Identify and hire project coordinator	Implement participant outreach and recruitment; assessment; and training strategies	6/3/15	Met with documentary evidence	Hiring documents
	b. Identify and hire online coordinator and multi-media development technician		8/24/15	Met with documentary evidence	Hiring documents
	c. Identify and hire clerical staff		10/1/14	Met with documentary evidence	Hiring documents
	d. Procure equipment		Aerospace 6/15/15 Advanced Manufacturing 4/21/16	Met with documentary evidence	RFPs, award letters, purchasing documents, board meeting minutes, news articles UAS drone equipment and van; Industrial Tech/Mnf equipment including lab renovation
	e. Hire faculty for each of four programs		Advanced Manufacturing 1/18/16 Aerospace 4/20/15 Cybersecurity 6/1-5/15, 7/6-10/15, 8/3-7/15 Green Energy 3/20/15	Met with documentary evidence Met with documentary evidence Met with documentary evidence NEI	AM, AE, CS: Job announcements, descriptions, letters of employment No documentation of faculty hiring for Green Energy program; however, green seminars were conducted.

Priority 1: Build Programs that meet industry needs. Activity 1: Partner with employers to develop four new training programs with industry-validated curricula leading to stackable credentials recognized by employers in each sector and rapid employment for trainees.					
Year	Milestones	Deliverables	Date	Status	Evidence
	f. Develop curriculum for four programs: aerospace, cybersecurity, green energy/smart grid technology, and advanced manufacturing		Advanced Manufacturing 8/10/15 Aerospace 8/7/15 Cybersecurity 6/1/15 CISSO, 7/615 CPEH, 8/3/15 CPTE Green Energy 3/20/15	Met with documentary evidence	Course lists, meeting notes, syllabi
	g. Secure employer partners for all programs		Advanced Manufacturing 8/6/15 Aerospace Cybersecurity 6/30/14 Green Technology 5/14/16	Met with documentary evidence and interview data	Meeting minutes, letters of support Interview data provided additional evidence of collaboration with employers for aerospace program.
	h. Validate curriculum with employers for four programs		Advanced Manufacturing 8/15/15 Aerospace Cybersecurity 9/9/15 Green Energy	Met with documentary evidence and interview data Met with interview data Met with documentary evidence NEI	Meeting minutes No documentary evidence for Green Energy curriculum

Priority 1: Build Programs that meet industry needs. Activity 1: Partner with employers to develop four new training programs with industry-validated curricula leading to stackable credentials recognized by employers in each sector and rapid employment for trainees.					
Year	Milestones	Deliverables	Date	Status	Evidence
	i. Identify and hire contractors and subject matter experts for four programs		Advanced Manufacturing 1/8/16 Cybersecurity 9/9/15 Aerospace 4/17/15 Green Energy	Met with documentary evidence Met with documentary evidence Met with documentary evidence NEI	Qualification reviews, job announcements, letters of employment No evidence for Green Energy curriculum
	j. Outreach and recruit students for four programs		Advanced Manufacturing 8/10/15, 9/16/15 Cybersecurity 6/1/15 Aerospace 8/7/15, 2/19-22/16 9/16/15, 10/16/15 Green Energy 3/20/15	Met with documentary evidence	Flyers, presentations, news articles, advertisements
	k. Conduct student assessments		8/10/15	Met with documentary evidence	WorkKeys test results Conversation with project director indicates that ACT Keys National Career Readiness certification test is one of the outcomes of the program, and it is not used to determine remediation needs.

Priority 1: Build Programs that meet industry needs.
Activity 1: Partner with employers to develop four new training programs with industry-validated curricula leading to stackable credentials recognized by employers in each sector and rapid employment for trainees.

Year	Milestones	Deliverables	Date	Status	Evidence
	l. Implement accelerated remediation as needed			Not Met	Conversation with project director indicates that this would only be implemented at student request.
	m. Enroll students (75)		Advanced Manufacturing 8/25/15, 12/15, 1/12/16 Aerospace 8/15, 10/15, 12/15 Cybersecurity 6/15, 7/15, 8/15 Green Energy 3/20/15	Met with documentary evidence	Class lists, sign-in sheets (includes enrollment in short term trainings and enhanced degree programs)
	n. Begin training delivery for four programs		Advanced Manufacturing 8/15, 12/15, 1/12/16 Aerospace 8/15; 10/15; 12/15 Cybersecurity 6/15, 7/15, 8/15 Green Energy 3/20/15	Met with documentary evidence	Class lists, sign-in sheets
	o. Formalize on-the-job (OTJ) training, internships, and apprenticeships		Aerospace Manufacturing Cybersecurity Green Energy	Not met	News article No evidence of formal on the job training, internships or apprenticeships was provided.
	p. Graduate students (25)		-	Met through self-reporting	Conversation with project coordinator indicates that UAV program will eventually be an elective for various areas. Could become a degree in the

Priority 1: Build Programs that meet industry needs. Activity 1: Partner with employers to develop four new training programs with industry-validated curricula leading to stackable credentials recognized by employers in each sector and rapid employment for trainees.					
Year	Milestones	Deliverables	Date	Status	Evidence
					future. Cybersecurity will be an elective. APR indicates gradates.
2 10/1/15 to 9/30/16	a. Outreach and recruit students for four programs (cont.)		Advanced Manufacturing 3/21/16, 6/3/16, 6/20/16 Aerospace 2/16, 3/16, 4/12/16, 6/16, 7/16 Green Energy 5/16	Met with documentary evidence	Flyers, presentations, news articles, advertisements
	b. Enroll students (100)		Advanced Manufacturing Aerospace 6/22-24/16 Cyber Security 3/1-19/16, 3/26-4/1/16 Green Energy 2/18/16	Partially met with documentary evidence	Course flyers Staff report four participants in this training. Email from project coordinator indicates 35 in this training.
	c. Deliver instruction for four programs		Advanced Manufacturing 6/20-24/16 Aerospace 3/4-5/16, 6/22-24/16, 7/23-24/16 Cyber Security 3/1-19/16, 3/26-4/1/16 Green Energy 2/18/16, 5/14/16	Met with documentary evidence	Course flyers

Priority 1: Build Programs that meet industry needs.
Activity 1: Partner with employers to develop four new training programs with industry-validated curricula leading to stackable credentials recognized by employers in each sector and rapid employment for trainees.

Year	Milestones	Deliverables	Date	Status	Evidence
	d. Place trainees onto career pathways in four target sectors		-	Not enough information	
	e. Graduate students (95)		-	Met through self-reporting	APR indicates gradates.
3 10/1/16 to 9/30/17	a. Outreach and recruit students for four programs (cont.)		Advanced Manufacturing Aerospace Cyber Security Green Energy	Met with documentary evidence and interview data	Flyers, presentations, news articles, advertisements Videographer who creates informational videos; host open houses and maintains Facebook page; take drone van for demonstrations
	b. Enroll students (125)		1/15/2017	Partially met with documentary evidence	Course flyers
	c. Deliver instruction for four programs		Advanced Manufacturing Aerospace Cyber Security Green Energy	Met with documentary evidence	Agendas, news articles
	d. Place trainees onto career pathways in four target sectors		-	Not enough information	
	e. Graduate students (120)		1/15/2017	Partially met with documentary evidence	News articles
4 10/1/17 To 9/30/18	a. Follow up only				Program delivery can continue into fall 2017 (Q1 of Year 4) but not further with TAACCCT funds.

Priority 2: Strengthen Online and Technology-Enabled Learning Activity 2: Incorporate mechanisms to provide feedback to course designers and instructors to facilitate continuous improvement.					
Year	Milestones	Deliverables	Date	Status	Evidence
1 10/1/14 to 9/30/15	a. Activate advisory committee to obtain feedback	Implement job placement strategies while enhancing technology-based instruction.	8/15/15	Met with documentary evidence	Meeting minutes
	b. Post project website to obtain participant feedback		1/28/16	Partially met with documentary evidence	The college website includes a link to a TAACCCT Round 4 page summarizing grant activity in each sector. However, no mechanism for participant feedback was noted.
	c. Establish and maintain social media to obtain participant feedback		4/21/16	Met with documentary evidence	An Alpena TAACCCT Facebook page was created. Review indicates the page is used to publicize upcoming trainings and seminars as well as other outreach activities.
	d. Create interactive online course content for all four programs		-	Not met	No documentary evidence provided. Industrial Technology faculty reported plans to develop remote instructional modules in order to maximize hands on time in the lab.
	e. Set up hardware and software tracking systems		5/2/16	Met through self-reporting	Program staff shared data dictionary for tracking student participants in grant programming.
	f. Employ simulations and video for instructional purposes		-	Not enough information	No evidence of use of simulations and videos for instructional purposes. Interviews with employers indicate that some simulation programs are used in cyber security training.
	g. Offer multiple access points to educational programs		-	Not met	No evidence of on-line learning development. Industrial Tech instructor reported plans to develop as part of HUSH program.
2	a. Access advisory committee to obtain feedback		-	Not enough information	No evidence of advisory committee activity for year 2.

Priority 2: Strengthen Online and Technology-Enabled Learning Activity 2: Incorporate mechanisms to provide feedback to course designers and instructors to facilitate continuous improvement.					
Year	Milestones	Deliverables	Date	Status	Evidence
10/1/15 to 9/30/16	b. Implement job placement strategies while enhancing technology-based instruction		-	Not enough information	No evidence of advisory committee activity for year 2.
	c. Track participant employment outcomes		8/16	Met with documentary evidence	Grant staff have created a database to track student progress.
	d. Improve (or maintain) course quality based on feedback		Spring 2016	Met with interview data	Employer interviews indicated feedback has been used to update/improve programs.
3 10/1/16 to 9/30/17	a. Access advisory committee to obtain feedback		Spring 2017	Met with interview data	Multiple employers reported participation on advisory committees once a year for development of and updates to curriculum.
	b. Implement job placement strategies		-	Not enough information	
	c. Track participant employment outcomes		-	Not enough information	
	d. Improve (or maintain) course quality based on feedback		Spring 2017	Met with interview data	Employer interviews indicated feedback has been used to update/improve programs.
4 10/1/17 To 9/30/18	a. Access advisory committee to obtain feedback			Not enough information	
	b. Implement job placement strategies			Not enough information	
	c. Track participant employment outcomes			Not enough information	
	d. Improve (or maintain) course quality based on feedback			Not enough information	

APPENDIX C: PROGRAM STAFF INTERVIEW PROTOCOL

1. To start off, could you tell me about your role in the TAACCCT Round 4 project at Alpena?

2. Tell me about how the grant is being implemented. *(Probe: organizational structure, meetings, what is going well, what is not)*

3. Have you been or will you be involved in curriculum development?
   a. What is your role in curriculum development?
   b. Could you walk me through the curriculum development process? *(Probe: how it was/will be selected/created/used, communication methods, plan for industry alignment, challenges, successes)*

4. How have programs been improved or expanded under the grant? *(Probe: student assessment and support, stackable/latticed programming, certificates, new programming, new methods, program structure, students)*
   a. What has been done for students?
   b. What has been done to enhance existing programs?
   c. What new programs have been developed? Will be developed?

5. What plans are there for further development of curricula and programs? *(Probe: how it will be selected/created/used, communication methods, plan for industry alignment, stacked and latticed programs, career pathways)*

6. What plans are in place for career pathways in the four areas? *(Probe: career preparation services)*

7. *For teaching faculty*: What are some of the changes you have experienced in your teaching since the grant project started? *(Probe: new position, updated content, new methods, course or program structure, students)*

8. Describe any capacity building within your department that you expect to see or have seen as a result of this project. *(Probe: programmatic, procedural, cultural)*
   a. How has the grant affected the college's capacity to provide work force development programming? *(Probe: equipment, relationships with industry)*?

9. Does the program incorporate online learning? If yes, please describe.

10. How are students responding to the program? *(Probe: feedback on coursework, employment)*
    a. Are you aware of students who have changed employment due to participation?

11. Can you tell me about the contributions that partners outside of the college have made or are planning to make to the project? *(Probe: factors impacting involvement, challenges, successes)*
    a. What mechanisms are in place for these contributions (advisory boards, curriculum committees)

12. In your opinion, which contributions from partners have made the most impact on the project? Anything that hasn't made much of an impact?

13. What is your overall opinion of the TAACCCT program at Alpena?

14. Do you have any suggestions for improving the project or STEM programming at Alpena? *(Draw from any negative answers to previous question)*

APPENDIX D: EMPLOYER INTERVIEW PROTOCOL

1. To begin, tell me a little about your agency/company. *(Probe: industry, size, needs)*

2. Could you describe your involvement in the project? *(Probe: new relationship or existing, curriculum development, factors impacting involvement, advisory council)*

3. Can you describe the contributions you and/or other employers and industry stakeholders are making to the development of the TAACCCT project? *(Probe: curriculum development, program design, recruitment, training, placement, resources, commitment to sustainability)*

4. In your opinion, which contributions from employer partners have been most critical to the success of the project so far?

5. In your opinion, which contributions from employer partners have had less of an impact on the project?

6. How will (has) the project affect(ed) your organization/company? *(Probe: hiring of workers, different employee skill sets, current employee training)*

7. What are your future plans for involvement with the TAACCCT project at Alpena? *(Probe: curriculum development, hiring)*

8. How do you envision the TAACCCT program fitting into the future labor market in your region? *(Probe: transferable skills and content knowledge)*

9. How does the project align with your current hiring needs?
   a. How do the skills taught in the program align with the skills you are looking for in your workers? *(Probe: missing skills, additional job training required, what other employers are looking for)*

10. Have you hired new employees out of this program? *(Probe: internships or job shadowing; if no, why not and if considering in the future; if yes, satisfaction with hires)*

11. Have you recommended any of the available training programs to your current employees? *(Probe: if no, why not, and if considering in the future; if yes, was there enrollment and what were results)*

12. What is your overall opinion of the Alpena TAACCCT project? *(Probe: strengths and weaknesses, suggestions for improvement; look for answers about how the program is/was managed and implemented)*
    a. What about the curriculum specifically?

13. Do you have any suggestions for improving the project? *(Draw from any negative answers to previous question)*

APPENDIX E: STUDENT QUESTIONNAIRE

1. Are you 18 years of age or older?
   o Yes
   o No *[Go to Termination Page]*

2. Have you participated in any of the following seminars or boot camps at ACC? *(Mark all that apply)*
   o Unmanned Aerial System (UAS) Seminar
   o Unmanned Aerial System (UAS) Pilot Prep Course
   o Advanced Manufacturing Boot Camp
   o Solidworks Workshop at HUSH Campus
   o Welding Workshop at HUSH Campus
   o Green Energy Technology Seminar (Builder's Refresher Course)
   o None of these *(Skip to Q17)*

2a. What date did you attend the Unmanned Aerial System (UAS) Seminar?
   o July 2016
   o December 2016

2b. What date did you attend the Unmanned Aerial System (UAS) Pilot Prep Course Seminar?
   o November 2016
   o January 2017
   o March 2017
   o May 2017

2c. What date did you attend the Green Energy Technology Seminar?
   o May 2016
   o April 2017

2d. What date did you attend the Advanced Manufacturing Boot Camp?
   o June 2016
   o February 2017

3. Why did you enroll in the seminar(s) or boot camp(s)? *(Mark all that apply.)*
   o Interest in the field
   o To gain new skills
   o To gain employment
   o To pursue a new career
   o To maintain current employment
   o To receive higher wages
   o To receive a promotion at my current place of employment
   o To pursue advancement in my field
   o Recommended by my employer
   o Other _____

4. How did you learn about the seminar(s) or boot camp(s)? *(Mark all that apply.)*
   o ACC Faculty
   o ACC Website
   o Letter from ACC
   o Flyer/Brochure
   o Internet (other than ACC website)
   o News article
   o Radio

- o Television
- o Employer
- o School
- o Veteran Services Organization
- o Workforce or unemployment agency
- o MI rehabilitation services
- o Other (specify) _____

5. Did you complete the seminar(s) or boot camp(s)?
- o Yes *(Q7)*
- o No

6. Why did you not complete the boot camp(s) or seminar(s)? (*Mark all that apply.)*
- o Completed what I intended to
- o Decided program was not what I wanted
- o Difficulty with program requirements
- o Conflict with work schedule
- o Family or other external obligations
- o Found a job
- o Medical issues
- o Other _____
  (Go to Q9)

7. Did you earn a credential or certificate as a result of enrolling in the seminar(s) or boot camp(s)?
- o Yes *(Q8)*
- o No *(Q9)*

8. What credential/certificate did you earn? *(Mark all that apply.)*
- o National Career Readiness Certificate (Work Keys)
- o FAA UAS Pilot License
- o Other (specify) _____

9. Before you enrolled in the boot camp(s) or seminar(s) what was your employment status?
- o Employed full-time in a field related to my program
- o Employed full-time in an unrelated field
- o Employed part-time in a field related to my program
- o Employed part-time in an unrelated field
- o Unemployed
- o Student
- o Retired
- o Other _____

10. Which best describes your *current* employment status?
- o Employed full-time in a field related to my program
- o Employed full-time in an unrelated field
- o Employed part-time in a field related to my program
- o Employed part-time in an unrelated field
- o Unemployed *(Q14)*
- o Student *(Q14)*
- o Retired *(Q14)*
- o Other _____

11. Which best describes your current work situation?
    o I am working at the same company I was working at before I started the program.
    o I am working at a different company than I was working at before I started the program. *(Q13)*
    o I am not employed. *(Q14)*

12. Which best describes your status with your company?
    o I have the same job I had before I started the program.
    o I moved to an equivalent position with a similar salary range and job title.
    o I was promoted.
    o I was demoted.
    o Other _____
     (Go to Q14)

13. Which of the following helped you get this job? *(Mark all that apply.)*
    o An instructor helped me make a connection with the company.
    o Apprenticeship or internship
    o College-organized tour of employer facility
    o Made a connection with the employer when they visited my college.
    o Job Fair
    o ACC Placement Office
    o Other_____

14. How would you describe the changes to your employment options (e.g., number of jobs you qualified for) since enrolling in the seminar(s) or boot camp(s)?
    o My employment options stayed the same.
    o I have more options for employment than before.
    o I have fewer options for employment than before.
    o Unsure
    o Other _____

15. How would you describe the changes to your wages since participating in the seminar(s) or boot camp(s)?
    o My wages increased.
    o My wages stayed about the same.
    o My wages decreased.
    o Other _____

16. Did you enroll in further educational programming as a result of your participation in the STEM seminar(s) or boot camp(s)?
    o Yes, I have since enrolled in a *degree* program at ACC.
    o Yes, I have since enrolled in a *certificate* program at ACC.
    o Yes, I have since enrolled in *credit bearing course(s)* at ACC (not a certificate or degree program).
    o Yes, I have since enrolled in a program or credit bearing course *at a different institution.* *(Specify institution and program)* _____
    o No, I was already enrolled in a program at ACC before enrolling in the seminar or boot camp.
    o No, but I plan to enroll in further programming in the future. *(Specify program if known)* _____ *(Q30)*
    o No, I did not enroll in further programming. *(Q30)*
    o Other (specify) _____ *(Q30)*
     (Go to Q19)

17. Are you currently enrolled in or taking courses in a degree or certificate program at ACC?
    o Yes *(Q19)*
    o No *(Q30)*
    o No, I was enrolled, but am not continuing.

18. Why did you not continue your enrollment? (*Mark all that apply.*)
    o Completed what I intended to
    o Decided program was not what I wanted
    o Difficulty with program requirements
    o Conflict with work schedule
    o Family or other external obligations
    o Found a job
    o Medical issues
    o Other _____

19. In which degree or certificate program(s) are/were you enrolled/taking courses? (*Mark all that apply.*)
    o Welding Technology, AAS
    o Welding Fabrication Certificate
    o Industrial Technology Certificate
    o Manufacturing Technology Certificate
    o Millwright Technician, AAS
    o Credit bearing course (*Specify course[s]*): _____
    o Other (specify)_____

20. What is/was your goal for this enrollment? (*Mark all that apply.*)
    o Complete individual course(s)
    o Complete a training credential
    o Complete an academic certificate
    o Complete a 2-year degree
    o Complete a 4-year degree
    o Transfer to a 4-year institution
    o Other _____

21. Why did you enroll in the degree or certificate program? *(Mark all that apply.)*
    o Interest in the field
    o To gain new skills
    o To gain employment
    o To pursue a new career
    o To maintain current employment
    o To receive higher wages
    o To receive a promotion at my current place of employment
    o To pursue advancement in my field
    o Recommended by my employer
    o Other _____

22. Which of the following ACC classes have you taken this year? (*Mark all that apply.*)
    o APP 125M Apprentice Machine Shop
    o CAD 150 3D Modeling Fall 2016 and Spring 2017
    o CAD 250 Advanced 3D Modeling
    o ELE 220 PC Based Data Acquisition
    o IND 229 Hydraulic and Pneumatic Power
    o MET 138 AWS Level I

- MET 238 AWS Level II
- MFG 101-Machining Processes I
- MFG 102 Machining Processes II
- MFG 120 Print Interpretation and Process
- MFG 122 Manufacturing Processes
- MFG 201 Intro to CNC
- MFG 202 Advanced CNC
- WLD 123 SMAW Welding Processes, Fall 2016
- WLD 123 SMAW Welding Processes, Spring 2017
- WLD 124 GMAW & FCAW Welding Processes, Fall 2016
- WLD 124 GMAW & FCAW Welding Processes, Spring 2017
- WLD 134 Intro to Welding Tech
- WLD 135 Intermediate Welding
- WLD 240 GTAW and Pipe Welding
- WLD 242 Welding Fabrication
- WLD 250 Adv Pipe Welding
- WLD 252 Specialty Welding and Testing
- None of these

23. Before you enrolled in the ACC degree or certificate program what was your employment status?
- Employed full-time in a field related to my program
- Employed full-time in an unrelated field
- Employed part-time in a field related to my program
- Employed part-time in an unrelated field
- Unemployed
- Student
- Retired
- Other _____

24. Which best describes your current employment status?
- Employed full-time in a field related to my program
- Employed full-time in an unrelated field
- Employed part-time in a field related to my program
- Employed part-time in an unrelated field
- Unemployed *(Q28)*
- Student *(Q28)*
- Retired *(Q28)*
- Other _____

25. Which best describes your current work situation?
- I am working at the same company I was working at before I started the program.
- I am working at a different company than I was working at before I started the program. *(Q27)*
- I am not employed. *(Q28)*

26. Which best describes your status with your company?
- I have the same job I had before I started the program.
- I moved to an equivalent position with a similar salary range and job title.
- I was promoted.
- I was demoted.
- Other _____
  (Go to Q28)

27. Which of the following helped you get this job? *(Mark all that apply.)*
    o An instructor helped me make a connection with the company.
    o Apprenticeship or internship
    o College-organized tour of employer facility
    o Made a connection with the employer when they visited my college.
    o Job Fair
    o ACC Placement Office
    o Other_____

28. How would you describe the changes to your employment options (e.g., number of jobs you qualified for) since enrolling in the certificate or degree program?
    o My employment options stayed the same.
    o I have more options for employment than before.
    o I have fewer options for employment than before.
    o Unsure
    o Other _____

29. How would you describe the changes to your wages since enrolling in the certificate or degree program?
    o My wages increased.
    o My wages stayed about the same.
    o My wages decreased.
    o Not currently employed
    o Other _____
    [Only show if respond 1 or 2 to Q25.]

30. Did you participate in a pre-enrollment interview or orientation at ACC?
    o Yes
    o No *(Q32)*

31. Who conducted the interview?
    o ACC staff
    o Michigan Works/WIOA staff
    o MI Rehab
    o Other (specify)_____

32. Did you complete any of the following assessments of your current abilities, skills, and interests as part of enrolling at ACC? *(Mark all that apply.)*
    o Yes, I completed the ACT Work Keys
    o Yes, I completed the GoToMeeting
    o Yes, I completed the Microsoft Lync
    o Yes, I completed the Myers-Briggs
    o Yes, I completed the National Career Readiness Certification Test
    o No, I did not complete any assessments as part of my program. *(Q36)*
    o Other _____

33. Who conducted the assessment(s)? *(Mark all that apply.)*
    o ACC staff
    o Michigan Works/WIOA Staff
    o MI rehab
    o Other (specify) _____

34. Did you participate in coursework as a result of this assessment?
    o Yes
    o No *(Q36)*

35. In which subject(s) did you take coursework? *(Mark all that apply.)*
    o Math
    o Reading
    o Workplace Skills
    o Computer/Technical
    o Other (specify) _____

36. Were you referred to any support services by ACC?
    o Yes
    o No *(Q38)*

37. Where were you referred? *(Mark all that apply.)*
    o Community Mental Health
    o Disabled Americans Veterans
    o VA service
    o Michigan Works/WIOA
    o MI Rehab
    o Other (specify) _____

38. Indicate your level of satisfaction with each of the following aspects of the ACC STEM program(s) in which you have participated.

	0 Does Not Apply	1 Very Dissatisfied	2 Dissatisfied	3 Somewhat Unsatisfied	4 Neutral	5 Somewhat Satisfied	6 Satisfied	7 Very Satisfied
Program (course) content	○	○	○	○	○	○	○	○
Course materials	○	○	○	○	○	○	○	○
Instructors	○	○	○	○	○	○	○	○
Hands-on experience	○	○	○	○	○	○	○	○
Technology-based resources	○	○	○	○	○	○	○	○
On-line learning	○	○	○	○	○	○	○	○
Opportunities to interact with potential employers	○	○	○	○	○	○	○	○
Internship opportunities	○	○	○	○	○	○	○	○
Apprenticeship opportunities	○	○	○	○	○	○	○	○
On the job training opportunities	○	○	○	○	○	○	○	○
Other (specify)_____	○	○	○	○	○	○	○	○

39. This section asks about your use of support services at ACC.

	Did you receive this service?		What is your level of satisfaction with this service?						
	Received	Did not Receive	1 Very Dissatisfied	2 Dissatisfied	3 Somewhat Dissatisfied	4 Neutral	5 Somewhat Satisfied	6 Satisfied	7 Very Satisfied
Pre-program assessment of skills, interests, and abilities	○	○	○	○	○	○	○	○	○
Prior Learning Assessment (PLA) credit	○	○	○	○	○	○	○	○	○
Prior military service credit	○	○	○	○	○	○	○	○	○
Remedial coursework	○	○	○	○	○	○	○	○	○
Career counseling	○	○	○	○	○	○	○	○	○
Academic counseling	○	○	○	○	○	○	○	○	○
On-line coursework	○	○	○	○	○	○	○	○	○
Digital tutoring	○	○	○	○	○	○	○	○	○
Peer tutoring	○	○	○	○	○	○	○	○	○
Job fairs	○	○	○	○	○	○	○	○	○
Job search assistance	○	○	○	○	○	○	○	○	○
Other (specify)_____	○	○	○	○	○	○	○	○	○

40. Do any of the following apply to you?

	Yes	**No**	**Unsure**	**Prefer not to answer**
Pell Grant recipient	○	○	○	○
Student with a disability	○	○	○	○
Trade Adjustment Assistance (TAA)-eligible	○	○	○	○
Veteran or spouse eligible for Priority of Service	○	○	○	○

41. What is the highest level of education you have completed?
    o Completed some high school
    o High school diploma or equivalent
    o Some college
    o Earned a one-year (or less) certificate
    o Associate's (2-year) degree
    o Bachelor's (4-year) degree
    o Master's degree
    o Doctoral degree
    o Other_____

42. What is your gender?
    o Male
    o Female
    o Other _____

43. Which of the following *best* describes you?
    o American Indian/Alaska Native
    o Asian
    o Black/African American
    o Hispanic/Latino
    o Native Hawaiian/Other Pacific Islander
    o White/Caucasian
    o Other _____

44. What is your age? *(Numeric responses only.)*
    _____

45. Please share any additional comments you may have about your experience at Alpena Community College:

APPENDIX F: STUDENT FOCUS GROUP PROTOCOL

Introduction: As I mentioned, we want to learn about your experiences in the Alpena Community College [name of STEM initiative] program. To start off, I'd like to hear about your experiences enrolling and participating in the [name of STEM initiative] program.

1. Tell me about enrolling in the program. *(Probe: why did you pick it, what do/don't you like about it, was it a good choice)*

2. Can you describe the process for enrolling? (*Probe: enrollment interview, assessments, credit for prior learning or military experience)*

   a. Did you complete any assessments of your abilities or skills when you first enrolled in the program? (Examples: placement tests, ACT WorkKeys, GoToMeeting, Microsoft Lync, Myers-Briggs, National Career Readiness Certification Test)?

   b. Could you describe your experiences with those assessments? *(Probe: when taken, where/who administered, impact on enrollment)*

3. Did you receive credit for prior learning or experience? *(Probe: if attempted and no credit received, military experience)*

   a. Can you describe the process for receiving credit? *(Probe: perceptions)*

4. Tell me about your experience in the [name of STEM initiative] program. *(Probe: expectations met, quality of instruction, technology, content, difficulty, new learning, online learning)*

5. What kinds of support has the college provided to you since your enrollment? *(Probe: counseling, referral, remedial classes, career guidance)*

   a. What was your experience with this support? *(Probe: perceptions)*

6. What is your opinion of the equipment and technology used in the [name of STEM initiative] program? *(Probe: issues, benefits)*

7. What are your career plans, and have they changed, since enrolling in the program? *(Probe: earn credentials, employers, career path, enrollment in further programming)*

8. What are some of the ways the [name of STEM initiative] program will help (has helped) you with your career? (*Probe: skills, career guidance, internships, job search, interactions with local employers)*

9. What is your overall opinion of the [name of STEM initiative] program? *(Probe: suggested changes)*

10. What else would you like to share about your program that we haven't talked about?