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

Final Report

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EVALUATION OF CLARK STATE COMMUNITY COLLEGE'S ADVANCING MANUFACTURING TO COMPETE IN A GLOBAL ECONOMY (AMCGE) TRAINING PROGRAM

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INTRODUCTION

In September 2014, Clark State Community College undertook an ambitious new program of reforms aimed at improving the economy of West-Central Ohio by increasing its advanced manufacturing and welding workforce. To support the needs of local employers, local jobseekers, and economic development efforts, Clark State Community College's *Advancing Manufacturing to Compete in a Global Economy (AMCGE)* program reformed and expanded the school's offerings in Manufacturing and Engineering Technology, added new lab spaces and equipment, extended student support services, and built bridges to local workforce development and employers. The three-year project was funded through a Round 4 grant from the U.S. Department of Labor's Trade Adjustment Assistance Community College Career and Training (TAACCCT) grant program and ran through March 2018 due to a six month no-cost extension.

The Education and Employment Research Center (EERC) at Rutgers, The State University of New Jersey, worked with Clark State Community College from the beginning to the end of the AMCGE grant period to conduct a comprehensive evaluation of grant activities. The evaluation team examined the multiple strategies that Clark State implemented in its Advanced Manufacturing programs to promote and develop career pathways and to build partnerships with key outside stakeholders. The evaluators utilized a mixed-methods approach to gather data from multiple perspectives on grant implementation and outcomes. Throughout the life of the project, the evaluation team examined the college's implementation activities, focusing on key issues related to the college's implementation of curriculum development and reform, program design and administration, student assessment, and partnership expansion. In addition, the evaluation examined the use of new equipment and laboratory space to examine its influence on instruction and learning; the strategies used for employer engagement and their relationship to labor-market alignment; and the implementation lessons to be learned from the project's approaches to creating stackable credentials and modernizing its programs.

This report is the final of three evaluation reports, reflecting an evaluation process that evolved alongside the program. The first report discussed the early implementation of grant activities from the start of the grant in September 2014 to June 2016; it identified promising practices and areas for improvement in the initial planning and launch phases. The second report discussed ongoing implementation activities from July 2016 to June 2017 and included an expanded student study, an expanded employer study, and preliminary student outcomes. This final report focuses on project activities that occurred from July 2017 to March 2018 with an emphasis on sustainability and reports on overall student outcomes resulting from the grant activities.

The EERC evaluation of the AMCGE program actually comprised two separate assessments. First, we conducted a *process evaluation* that examined the implementation activities and organizational structure that undergirded the TAACCCT program at Clark State Community College. This included the planned implementation activities and their prospects

for sustainability. Second, we conducted an *outcomes analysis* that examined the quantifiable impact of the program on students affected by the grant. The methods and results of each evaluation are presented separately in this report. The report concludes with reflections on lessons learned from the project across evaluations, and an overall assessment of the long-term goals and sustainability of grant efforts.

Local Context: Motivations for TAACCCT participation

Clark State Community College is located in the small city of Springfield, in Clark County, Ohio. Clark County, and Springfield particularly, have faced tough economic times in recent years. According to a recent Pew analysis, median household income for three-person households dropped 27 percent in Springfield, Ohio, compared to approximately 8 percent nationwide in the 15 years between 1999 and 2014 (Berliner, 2016). Whereas the 2016 median household income in Ohio was $50,674 ($27,800 per capita), and 14.6 percent of Ohio residents lived in poverty that year, the 2016 median household income in Clark County was only $44,154 ($23,992 per capita), and 15.7 percent of residents lived in poverty. Springfield incomes were even lower; in 2016, Springfield's median household income was $32,165 ($19,608 per capita) – with 18.1 percent of the population making less than $10,000; 27.9 percent of the city's population was living in poverty.

Economic decline has ushered in a period of population decline in Clark County (-2.6% between 2010 and 2016). It sits between the larger cities of Dayton and Columbus, Ohio, which can draw off talent; for example, between 1970 and 2015, Springfield's local population declined 27.2 percent, while Columbus's climbed 57.4 percent (Berliner, 2016). Most residents of the county are white (84.7%), and only a small percentage (2.1%) are foreign-born; the median age is 41; and less than 1 percent of the population are veterans. Nearly half – 44 percent – of the population of the county lives in Springfield.

Manufacturing is at the core of local economics; in 2015 the industry that employed the most people in Clark County was manufacturing, with its 10,270 employees. According to Clark State's proposal to the Department of Labor, offshoring and foreign trade impacted the manufacturing labor force that Clark State serves along with the manufacturing sectors of all seven of the Ohio Area 7 Workforce Board's counties over the last eight years. In all, over 6,000 manufacturing workers in the region were laid off between 2008 and 2014. Manufacturing was one of the three main industries that was impacted and had active petitions for TAA grants, with 1,484 (15%) of eligible workers affected.

There is a sizeable population in Clark County who could benefit from increasing opportunities to participate in higher education; while the vast majority of residents hold a high school degree or higher (as of 2016, 82.4%), only 15 percent hold a bachelor's degree or higher (Quick Facts).

Clark State Community College is a small-to-midsize college. Its primary service area is Clark County, in which forty percent of the students are residents. However, the college's reach extends into other counties, with satellite locations in Logan and Greene Counties, and Champaign County (between Clark and Logan counties) also included in the service area. . According to Clark State's Spring 2017 enrollment data, the school had 6,374 students, with a 12-to-1 faculty-to-student ratio. Table 1 shows student characteristics for all Clark State students during the Spring 2017 semester.

TABLE 1. CLARK STATE STUDENT CHARACTERISTICS, SPRING 2017

Background Variables	%
Enrollment Status	
Full Time	20
Part Time	80
Gender	
Male	37
Female	63
Age*	
Under 18	13
18-24	49
25-39	28
40-59	10
Over 60	1
Race	
White	76.4
Black	14.7
Native American/Native Alaskan	1.6
Hispanic	1.5
Asian	1.4
Native Hawaiian	0.3
Other	4.1
Total Number of Students	6,374

Source: Clark State enrollment data, https://www.clarkstate.edu/fast-facts

*Total percent may not add to 100 due to rounding

Of the cohort of students who enrolled in the Fall 2016 semester, 57 percent of full-time returned to Clark State for further studies, and 41 percent of part-time students returned. The National Center for Education Statistics (NCES) measures graduation rates by completion and lengths of time to degree. They divide lengths of time into three categories: "normal" (e.g., a bachelor's degree takes four years, while an associate degree takes two years), "150 percent of normal time" (e.g., taking three years for a two-year program), and "200 percent of normal time" or "twice as long as normal time." Table 2 shows retention and graduation rates for Clark State students as of the Fall 2017 semester.

TABLE 2. CLARK STATE RETENTION AND GRADUATION RATES

Variable	%
Clark State retention rate, Fall 2016 to Fall 2017, by student enrollment status	
Full time	57
Part time	41
Completion rate of students who began at Clark State in Fall 2014*	
Graduated	21
Transferred out	20
Length of time to graduate from Clark State for students who began in Fall 2013*	
Normal time	5
150 percent of normal time	15
Twice as long as normal time	21
Length of time to graduate from Clark State for students who began in Fall 2014*	
Normal time	7
150 percent of normal time	21

Source: National Center for Education Statistics

**Note that not all students at the institution are tracked for these rates. Students who have already attended another postsecondary institution, or who began their studies on a part-time basis, are not tracked for this rate.

In its initial application to the Department of Labor, Clark State noted that it had strong enrollment in manufacturing certificate and degree programs, but the completion rates were comparably weak due to students' developmental education needs and a labor market demand that enabled students to gain employment after only a few classes, thus hurting retention, completion, and graduation rates. This was an important motivating factor for its participation in TAACCCT; the school wanted to find ways to enhance these rates to better serve students. The jobs that the school selected to focus on would, for the most part, put its students into the average wage ranges for the area (see Figure 1, a table submitted with Clark State's DOL application based on Burning Glass data). As the programs Clark was offering were credit-bearing and stackable, they offered students not only a pathway to the middle class, but also moved them up the road toward a college degree.

Figure 1. Table submitted with Clark State's DOL grant application. Numbers are based on Burning Glass data.

Table 3: CSCC Project Region – Real-time Job Postings, Salaries and Educational Requirements

SOC Code - ONET-6	Occupation title	Real Time Job Posts	Real Time Mean Salary	% HS or GED	% Post-Sec. or Assoc.	% Bach.	% Grad. or Prof.	% Educ. Not listed
17-3026	Industrial Engineering Technicians	2	N/A	N/A	N/A	N/A	N/A	50%
17-3027	Mechanical Engineering Technicians	35	N/A	21%	54%	63%	17%	31%
17-3029	Eng. Tech., Except Drafters, All Other	115	$44,643	68%	31%	26%	10%	46%
49-9043	Maintenance Workers, Machinery	23	N/A	100%	18%	0%	9%	52%
49-9071	Maintenance & Repair Workers, General	860	$40,048	85%	18%	10%	7%	54%
51-1011	First-Line Sup./Mgr. – Prod. & Oper. Wrks	319	$52,243	37%	14%	71%	3%	37%
51-4011	Computer-Controlled Machine Tool Operators, Metal and Plastic	327	$35,177	95%	3%	2%	0%	59%
51-4012	Num. Tool & Process Control Programs	48	$51,198	52%	43%	52%	0%	56%
51-4041	Machinists	111	$38,414	93%	2%	7%	2%	60%
51-4111	Tool and Die Makers	55	$43,177	100%	0%	0%	0%	64%
51-4121	Welders, Cutters, Solderers, and Brazers	94	$34,939	93%	7%	5%	0%	56%
51-9061	Inspectors, Testers, Sorters, Samplers, and Weighers	282	$43,109	59%	18%	31%	16%	56%

Source: Labor/Insight Jobs (Burning Glass Technologies): Summary demand and requirements table by occupation
This report provides information on both the preferred and required education levels for job postings. Educational requirements may be counted multiple times. Postings available with the current filters applied May 1, 2013 through April 30, 2014 = 2611

IMPLEMENTATION PROCESS EVALUATION

Evaluation Methods

EERC's early implementation analysis of the AMCGE program focused on resources invested in the program and the college's implementation of key grant activities, following a *program logic model* developed collaboratively by the Clark State and EERC teams in July 2015.[1] Logic modeling is a tool used by evaluation researchers and implementation teams to ensure that everyone involved in the project understands how the program will produce its intended results; it is a shared roadmap for the program (W.K. Kellogg Foundation, 2001).The program is illustrated by resources, or *inputs*, applied to the project and the *activities* that will be undertaken throughout the life of the grant. The intended results are broken down into three levels: *outputs* – direct results of program activities, *outcomes* – changes in the participants, which are typically observed within one to three years (longer-term outcomes may take four to six years), and *impacts* – fundamental changes to the surrounding community or the organization, which are expected to emerge in seven to ten years (often after the conclusion of the project). Through its focus on broader impacts and longer-term outcomes, the program logic model encourages us to think beyond the boundaries of program grants and recognize the broader change that programs are working toward.

The logic model developed by the Clark State and EERC teams framed our analysis throughout the evaluation. It was revisited yearly with the project manager and adjusted if necessary to accurately reflect the project activities. In this report, we examine the grant's overall progress with regard to the activities and outcomes included in the logical model as well as program outcomes and potential future impacts. All data included in this report cover the time period between July 2017 and June 2018 and were collected using the following methodologies:

Site visit. EERC conducted a formal site visit to Clark State on February 8th and 9th, 2018. During the site visit, our evaluators collected information from multiple stakeholders involved in the project, conducting 11 semi-structured interviews with program staff and faculty involved in the grant onsite during our visits, and 3 by telephone in the months afterwards to accommodate scheduling conflicts. We also conducted one focus group with manufacturing students.

Telephone meetings and interviews with project leads. To understand ongoing program implementation efforts, EERC called project leads monthly to conduct informal check-in meetings. Additional calls were made to the project manager in December 2017 and June 2018 to conduct formal semi-structured interviews to assess implementation progress and conduct an ongoing review of the logic model.

[1] The logic model is included in the Appendix.

Document review. We continued to collect relevant documents throughout the data collection process whenever such documents became available. This additional information included meeting minutes, agendas, college forms and policies, news clippings, and other informative documents about employers.

Expanded Employer Study. This year the team examined two sources of data to create micro case studies of the relationships between Clark State and local industry and on specific employers and their relationship with the college. To do this, we used the following two sources of data:

- *Employer Interviews***.** In February 2018, we conducted telephone interviews with three employers identified as program partners by the Clark State team. Those interviews covered topics such as their perceptions of the state of the industry and the state of the workforce; their workforce needs and HR practices; and their working relationship with Clark State and other community college programs. These interviews were added to the five interviews conducted in the prior year.

- *Employer-contacts survey***.** Prior to the April 2017 site visit, we asked college staff who were involved in employer-engagement efforts to complete a short survey. We asked them to identify five employers that they personally had contact with. The survey included questions about the kinds of contacts they made, the methods of communication they used, and the nature of their relationships with employers. The seven respondents include instructors, the navigator, and project and college leadership. In June 2018 we conducted an additional follow up survey of college staff in which we asked about their contacts with specific employers who were included in the interviews.

The goal of this case study-style analysis of relationships was to understand how the colleges and employers related to each other: what modes they used to communicate, the nature of their interactions, and the level of formality involved.

We analyzed all data using established analysis techniques. Qualitative data were managed, coded, and analyzed using qualitative analysis software NVIVO 10.

Key Implementation Activities

In the sections that follow, we present updated findings related to progress on implementation activities (space and equipment in the program; curriculum; the career navigator model and recruitment; and engagement with employers and the workforce system). As in previous reports, we frame our discussion around the program logic model. Prior interim evaluation reports explored how expected program inputs (i.e., resources) were made available to the project and leveraged and how implementation activities were conducted, and they identified early signs of whether the program was meeting its expected outputs and outcomes. Now that the program has operated for a full two years with the majority of its equipment and

curriculum reforms in place, we are able to further explore the outputs, outcomes, and early evidence of impacts. In this report we also revisit the employer study via the aforementioned case studies of the college-employer relationship. We explore strategies that were the most effective in engaging employers along with how employers responded to those efforts, and we discuss implications for the college as it moves forward with maintaining and expanding these relationships.

Project Organization and Staffing

Although the project maintained a structure similar to the one documented in our interim reports, some significant staff changes were made as the grant funding wound down and the college moved toward a more permanent, college-funded staffing model. As part of this adjustment, existing staff from other units in the college began to absorb some of the grant's roles and functions.

The grant began with the following staff to implement AGCME:

- Project Director (existing Provost)
- Project Manager (new hire for the grant)
- Dean and Assistant Dean of Business and Applied Technologies (existing positions)
- Faculty Coordinator, Industrial Engineering Technology (existing position)
- Instructor, Welding (new hire for the grant)
- Career Navigator (new hire for the grant)
- Associate Dean of Academic Affairs (existing position)
- Marketing Manager (existing position)
- Director of Institutional Research (existing position)

This group was the core of the Project Leadership Team (PLT), which met biweekly throughout the grant period. The PLT also included representatives from the Clark County Department of Jobs and Family Services. Throughout its duration, the team working on or adjacent to the project included three consultants from the National Council on Workforce Education; an I-BEST consultant; other staff members from within the college, including the registrar and assistant registrar, the dean of student support services, and the career services coordinator; the employer advisors; and representatives from the local Chamber of Commerce. The project also had the full support and input of the college president from beginning to end. In short, it was a major undertaking that was not limited to the MET building; rather, it involved a large community of committed faculty, staff, employers, and other stakeholders.

This sizeable community indicates a culture at the school and in the surrounding area that is committed to achieving grant goals, so it is perhaps little surprise that work to achieve those goals will continue on after the grant. The three new positions created for the grant will continue to exist in one form or another: the career navigator's duties will be spun out into other positions, and the full-time welding faculty position will remain as it was established under the

grant. Only the project manager is still the original position-holder, as the original career navigator and welding instructor have moved on. The remaining project-specific position, project director, also experienced a change when the provost/academic VP who was serving in that position left shortly before the conclusion of the grant. Clark State brought in the dean of business and applied technology to serve as project director through the conclusion of the grant. The new project director is an appropriate fit for the position as she has been heavily involved in the TAACCCT project from its design phase to the end of the grant period, and she was the original interim project manager while Clark State conducted a job search for that position.

A new part-time career navigator worked on the project from December 2017 through May 2018, replacing the previous navigator who left in August 2017. For the time she was there, the most recent navigator was in an advantageous position to work in this role, as she was retired from and had over 40 years of experience in the manufacturing industry – from the assembly line to having about 400 people reporting directly to her as an operations manager. As career navigator, she explained that she knew firsthand,

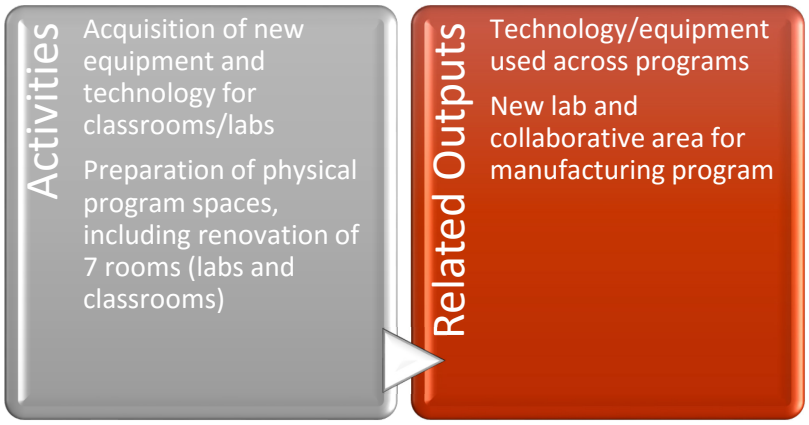
> . . . how difficult it was – or is – for . . . manufacturing companies to be able to find qualified individuals that had a desire to learn more. So when I was approached about this position, that kind of fit right into what I've been doing all my life, because in my role in manufacturing I'm kind of that advisor with the folks that were working for me.

As we will discuss in the career navigator section to follow, after the second navigator's departure, there was no attempt to replace the position; post-grant, its roles were to be absorbed into the student support services and advising department. One Clark State staff member from this department described the duties of the career navigator as reflecting a model of what TAACCCT had done in advising, but instead under the responsibility of what they called success coaches. He described how the role of the career navigator was eventually reflected in the roles of the success coaches,

> So we've kind of borrowed . . . some of the processes and things of that nature, getting more involved with working with some of the outside resources, jobs, and family services, and some of the employers when it comes to getting students more information.

Space and Equipment

Interview respondents report that the labs at Clark State continue to function well and remain a point of interest for students and employers. When asked what they like about the program, students often mentioned hands-on



learning and being able to use the lab. The labs have also drawn the attention of local employers, with one stating:

> Well, I think the labs that we have here at Clark State is right down where we need to be. I mean, they've got good equipment, good instructor that we've dealt with. . . . Ours has been mostly the weld focus, and the lab, I mean, all you've got to do is walk down there and see and talk to the students, talk to the instructors, see what they're doing. That's the right path. I mean, they've got the equipment that we would be using. It's not just classroom. It's teaching them how to actually perform the job, on top of the knowledge part.

Based on employer input, the college added robotics equipment. When several local employers suggested that the college add robotics instruction, leadership introduced robotics courses into their advanced manufacturing programs. Last year the college was hoping to be able to obtain four machines in order to run a class with twelve students, but they managed to acquire six, enabling them to maintain a 2:1 ratio of students to machines. The college is not currently looking to acquire more machines due to space restriction. When asked about this, one faculty member noted, "We really don't have any more space. And . . . this is new territory for us – so I mean, when you're talking about robots, you're talking about safety and reach and space." While the college will not be acquiring any more robotics machines presently, the faculty member stated that they may reevaluate once they see how all their machines work in the space provided.

In the last year, the college also added and improved online learning lab content. When asked about the learning lab, one instructor noted:

> We are adding. What I have done is consolidated materials. We are taking a lot of the old materials and moving them out. There's a lot of duplication and things like that. We need to eliminate the duplication and things that are not pertinent to what we're doing now.

These changes help organize online content for students and keep learning lab materials up to date.

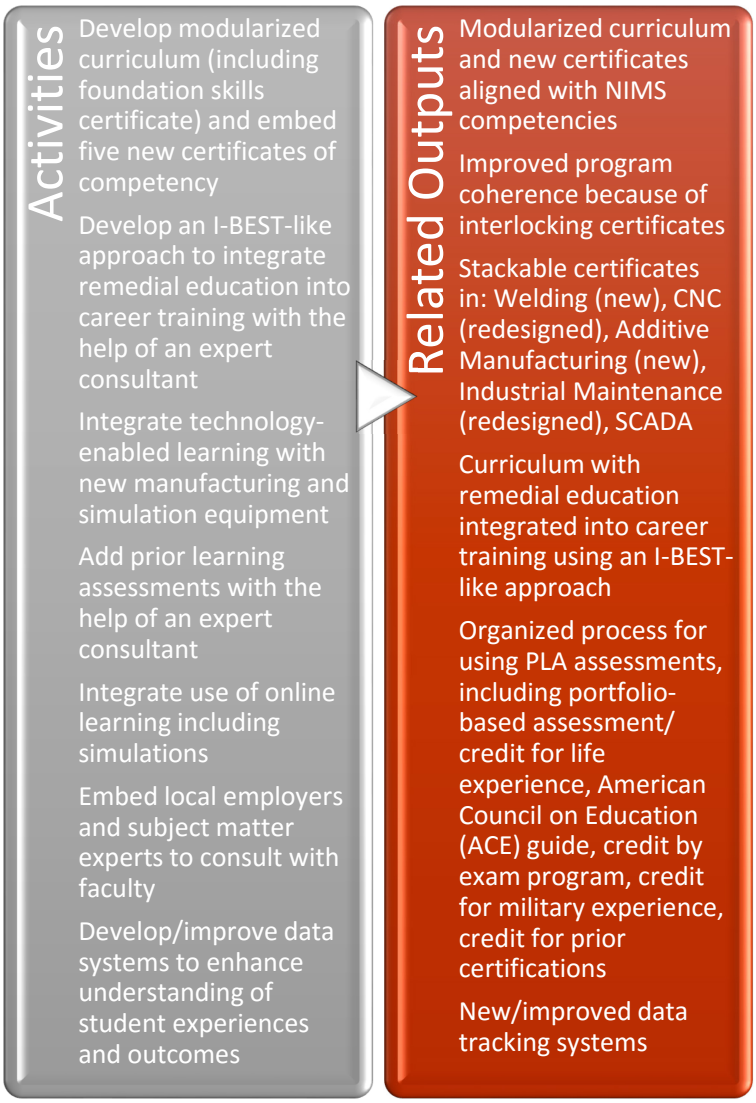
To maintain the lab after the grant ends, college staff economized their use of supplies and sought out more donations. One of the concerns for the future is the college's ability to maintain and update its new equipment. One faculty member explained, "Right now everything's brand new. Once you get in a few years, and you start having wear and tear on equipment . . . . How things are gonna work – I think it's always a big concern." Other faculty and staff stated that the college is working through potential budget challenges, and there does not seem to be any immediate concern for the loss of equipment. According to college leadership, one aspect of the program that will most likely be lost is the supplies budget. College leadership has already begun to encourage faculty to "be more creative about how they structure their projects and how they use their resources and how they ask for donations." The college has already secured at least one steady donation for a welding class and hopes to

continue to find solutions that will allow them to maintain a consistent level of supplies for this engaging component of MET coursework.

Finally, under this grant, employer relationships originally started through TAACCCT continue to be leveraged to gain more resources for Clark State. Through engagement efforts with local employers over the past year, the college received funding from employers for manufacturing scholarships as well as for the manufacturing classroom and lab. The administration has consistently conveyed that none of these resources would have been secured without the work that was accomplished under the TAACCCT grant.

Curriculum

The AMCGE project built on preexisting programs in the Manufacturing Engineering Technology department (CNC and Industrial Maintenance, which were redesigned) and added three new programs (Welding, Additive Manufacturing, and Supervisory Control and Data Acquisition, or SCADA).[2] In the final year of the program, there were no major changes to the curriculum. The SCADA certificate (an add-on certificate for the Industrial Maintenance program) operated for its first full year, though demand from both students and employers was generally very low. The programs integrated technology-enabled learning and new manufacturing and simulation equipment in the lab spaces, which were received very positively by students and area employers.



I-BEST is up and running, and it is improving with time. As was noted in our interim reports, Clark State adopted an I-BEST-style model that integrates developmental education into regular technical courses in the MET programs. In this model, an MET faculty member is paired with a

[2] Appendix B documents the MET pathways, including how these certificates nest into AAS degrees and which courses are required for each.

College Preparatory Education (CPE) faculty member, and the two design and implement a curriculum that uses the regular technical curriculum to illustrate elements of math, reading, and writing. I-BEST was piloted in Spring 2016; faculty had a training session the following summer and launched the program in earnest in Fall 2016. The model was adopted in all sections of two core classes taken by all MET students: ENT 1000 (Introduction to Industrial and Engineering Technology, which is paired with English) and ENT 1050 (Manufacturing Foundations, which is paired with math). There is now a core team of instructors on both the technical and developmental sides who work on these classes and will continue to do so in the future.

The I-BEST method's success is largely contingent on the collaborative relationship of the faculty pairs, as noted in our interim reports. In its ideal form, the teaching relationship for these courses is fully integrated; this is not a model of 'one day developmental education teaching, one day technical teaching' but rather a model where the concepts bleed together fully as the instructors co-teach. This requires a very high level of cooperation between MET and CPE instructors throughout the entire process, from planning, to teaching, to evaluation. As one instructor noted, "It is a true team-teaching setting. It's not paired. It's a team. We teach as a team."

In the earliest round of I-BEST implementation, there were some hiccups as everyone got used to the model, which we described in Interim Report #2. Some pairings worked seamlessly, and others were a bit more fragmented. One secret to success that emerged in our 2018 interviews was ensuring everyone involved had the same vision for what the I-BEST model actually was. This was an issue for both developmental and technical instructors, as there was blame coming from both sides early on. One CPE instructor complained in early interviews that the developmental components were sidebars in the course rather than fully integrated into the content, and that the MET instructor did not know what to do with the developmental instructor. One MET faculty member complained that the CPE instructors thought their roles were limited to their usual areas of expertise. However, in the 2018 round of interviews with faculty and staff, the model appeared to be working much more effectively with each other.

How did they become more effective in these working relationships? One college leader noted that the key lesson from going through the I-BEST development process was that "you need to spend some time and make sure the relationships work." Two key success factors that emerged were communication and planning, which is consistent with current research on the I-BEST model.[3]

Communication was critical to the working relationships at the heart of I-BEST, as the model is new and quite different from the usual pedagogies for both technical and developmental education. This is part of the growth in the modern community college model; rather than focusing on offering general education to prepare students for the traditional

[3] See for example Wachen, Jenkins, Belfield, and Van Noy (2012) and Wachen, Jenkins, and Van Noy, et al. (2010).

transfer to four-year institutions, Clark is joining a myriad of community colleges in integrating applied workforce education into its core offerings. The I-BEST approach marries the two models, helping students who need applied skills for the workforce to achieve gainful employment in the short term while also offering credit for that work and placing them on a path for further degree-bearing education in the future. This involves building and strengthening connections among faculty from different backgrounds and departments and adapting pedagogies.

The MET faculty were positioned to share this vision of integrated learning; since they were more deeply involved in the overall program design and implementation, they were already aware of how I-BEST fit into the overarching logic of career pathways development that AMCGE was following. One MET faculty member described the process of building the team relationship:

> What's been funny is my [developmental faculty counterpart] has really been surprised that they've had so much latitude. I mean, at least the way I partner with them. They said, 'Look, here's what we're doing, how do you want to teach it?'
>
> I said, 'What do you mean?' I said, 'Well, you're my expert.' I said, 'What do you think is going to be the best?'
>
> 'Well, this is your class.' No. And once they really have a chance to dig in – it's been interesting because it's happened with every teacher since the first one I worked with – is they're just stunned that they're able to have so much latitude. Because they really, I think, come into this [thinking] they're just there for the [developmental] component, where I treat them truly as a partner. I've got my components I'm going to work on, and I want you to chime in. But I've got components here that – [they] are much more the expert on this. I'm happy to help in part and do what's needed where it's needed, but 'What do you think?'

Over time this faculty member developed a strong working relationship with the CPE counterpart who had been the subject of the above quotation and had a very positive collaborative experience.

Planning is also a key part of developing I-BEST working relationships. One project leader noted,

> I think that having the planning time has been crucial for the instructors being on the same page before they walk in the room. I think that was a really intelligent way to approach it, because most of the instructors that we ended up getting . . . didn't have a technical background to know how to integrate the two. . . . So having that planning time really helped open their eyes to, 'Okay, I can see how these things connect.'

With scheduling issues, it was not always possible to keep teaching teams together that worked well, so every semester could see a fresh start in relationship building. As one project leader noted, drawing staff from different departments will inherently lead to some turnover in

the roles, as the two departments have to coordinate to maintain a full teaching load for each of their employees. The pairings themselves can be challenging, as some teams gel and others do not; faculty described widely varying experiences based on whom they were paired with each semester. However, there is now a core team of MET and CPE faculty with experience working within the I-BEST framework, which should make pairings easier going forward.

I-BEST has been viewed positively in the school. When the model comes together well, it is exciting for all involved. One faculty member stated,

> I think it completely enriches the introductory classes for these students. The English is just critical, I think, because we're able to incorporate techniques and skills that individuals may have long ago put away . . . because they haven't had to write a paper, they haven't had to look at technical reading, technical writing. But we're able to offer that in such a way that it's applied.

Continuing on, the faculty member noted that the hallmarks of successful teaching included rigor, relevance, and relationships. "And you know what? I think we're able to do all of those. We still provide, in most cases, a pretty rigorous curriculum, because we have to cover a lot of ground. It's very relevant. And then we build great relationships because we have subject matter experts on both sides."

In our 2018 interviews, faculty members' descriptions of their experiences teaching the I-BEST model were very positive; the collaborative framework appeared to offer them a meaningful and rewarding teaching experience now that it was more established. In the words of one faculty member, "I absolutely love it, and I hope we continue it." Another faculty member noted,

> In terms of being able to create such relevant curriculum – it's been a fun growth experience I think for all of us, because I'm getting a chance to interact with content that sometimes I haven't been around in a while. But I see the academic faculty becoming so much more engaged in what we're doing, and they just have – They are equally excited and amazed by the applications of a lot of what they teach.

The I-BEST approach was also seen as having a very positive impact on students in their first semesters of the program, when some were returning to school after a long gap in education, or after having experienced the trauma of job loss, and could be less sure of themselves. A faculty member described a student who told his two instructors after the first night that he was going to drop the class but managed to stay enrolled and persevere. The faculty member felt that the presence of two instructors was instrumental in retaining that student:

> Respondent: I think it's incredibly comforting for both of – for all of our students to have the extra resource in the classroom. We especially – Even just this last term, I had a gentleman who's coming back [to school]. Quite honestly, we thought he wasn't going to come back. He left the first night very, very stressed. . . . I think it was fear of technology. He was kind of coming back for a second

or third . . . career. Had been a truck driver, had been in some more service industry, but just really had never had to embrace the technology, and thinking of having to use a computer to type a paper was just utterly terrifying. And I think between myself and the English teacher, we were able to just talk with him, reassure him. He even left that night and says, 'Well, I appreciate it, but I still think I'm gonna drop.' And he came back.

Interviewer: Oh good.

Respondent: And I think it's been the combination of myself and the English teacher, just working with him. Having the opportunity to have that one-on-one. Even when we have classes as large as 16 or 17, the extra faculty member really helps for bridging that gap for those who really, really need it.

Another benefit of having two instructors that was cited during our interviews was simply the extra point of human contact. Some students may be more drawn to one instructor or the other, but at a critical early point in their schooling, this model gives them one more member of the Clark State community with which they could connect. According to one faculty member, "The two of us being in there really creates more of a comfortable setting. . . . It just gives us one more layer of attack that we can help meet these students' needs and meet them where they are."

Another faculty member noted the benefit of extra resources with this population of students, who were often nontraditional and could be at risk of dropout:

You're dealing with so many people that are coming in, that either this is a second career choice, this is – 'I want to do something different,' or it's 'I just lost my job, this is my only ticket in.' Because any of those resources you can have, both with the I-BEST, as well as the career navigator position – it's vital. These are people [for whom] college is either something that has always been thought of as unattainable, or they're in it because they have no other choice. But they're still lost, and they start feeling like a number. And when you start feeling like a number, you start getting despondent. You're not sure where to go, who to talk to – you're going to leave. . . . These folks need support. Most of them are first-time college students – most of the time, first time in their families going to college, and just – usually they're working full time. They need that help.

The faculty member also noted the benefit of an extra faculty member in these early classes:

The I-BEST, where we've got two different people that they can come to – Our schedules can be different. I know [my co-teacher] gave them his hours that he's on campus; if they need extra help with those things, then he can help them with that. Or [another co-teacher], when she was teaching the math portion, was available to tutor and help these individuals. I think the I-BEST and your introductory classes are really gonna be a key component if you wanna continue to increase your retention, just because it helps everyone establish their foothold. Once they're comfortable and they get their foothold in those first two classes, they're gonna be much more likely to succeed.

According to faculty, the students are also improving greatly in their foundational skills. One noted, "[My co-teacher] says all the time it's amazing what the students are producing from that first draft to where they're at now. We're at Week 4, and he is really impressed."

Not all students who take these courses will be able to place into college-level English and math courses without further developmental education. Throughout the semester, the developmental education faculty assess progress, and in the end, they sign off whether each student is ready for the next level. As the English and math counterparts come from the CPE program, they are very familiar with its courses and are able to recommend which courses students may still need prior to taking on college-level coursework. However, thanks to the I-BEST model, students are able to "hit the ground running" and immediately enroll in courses they are interested in rather than spend their first term (or more) languishing in CPE classes, where they are likely to become discouraged before they are even allowed to get started on the path they chose. One faculty member described this benefit:

> I think that was huge, and I see the big difference. I'm not saying that everybody passes and everybody does great and everything. You still have those it doesn't matter what you do. But they come in and they're passionate about already what they're doing because they're at least in our building [taking courses], and they're doing what we do. They're not sitting . . . somewhere else.

I-BEST will be sustained, and possibly expanded, in Manufacturing and Engineering Technology programs. One project leader summed it up, "I think I-BEST is a rousing success." The program was in fact seen as valuable enough that an adapted version was written into the forthcoming Applied Baccalaureate, with a proposed fee to cover its added expense, and the school is pursuing additional sources of grant funding to expand its I-BEST offerings.

Prior Learning Assessments (PLA) received a school-wide overhaul. In the spring of 2018 Clark State launched a new website with a guide to PLA for interested students and prospective students (https://www.clarkstate.edu/admissions-financial-aid/prior-learning/). The new website offers clear information on what PLA is, what the process of receiving credit for prior learning is at Clark State, and how certain types of prior learning (e.g., AP credit, military service, on-the-job training, noncredit coursework) may translate into credit at Clark State and what the associated fees are. Achieving PLA reform was a larger project than originally anticipated, as it was a school-wide effort involving many stakeholders, and faculty buy-in was critical. The school used consultants to help guide faculty through the process, and respondents were generally positive about the consultants' work on the reform. The faculty had to approve of and buy into the new system, which led to some delays that were discussed in our interim reports. Faculty also had to learn about alternate ways to assess prior learning, as many were only familiar with portfolio review, a very laborious process that might prevent students from participating in PLA. Additionally, the general PLA process has launched, but there is not a specific PLA process for each course offered at Clark State. Therefore, they needed to work out a compensation structure for faculty for both the design of PLA processes and for the review of student assessments. One college leader reflected on key lessons and noted,

> [You] just always need to allow time for faculty to wrap their head around [changes]. And I think we thought that we could push [PLA reform] through quicker than we did. And 'push it through' is probably not the best word, but [we thought] it would become approved quicker than what it did. But it was also really necessary to allow that time for the faculty as a whole to understand what this was.

With the faculty involved, the process of PLA reform took approximately two years – nearly twice as long as anticipated. The school can learn from this as they continue with future reforms; faculty play a critical gatekeeping role for the quality of a school's credits, but due to the structure of their schedules, it can be difficult for them to react quickly.

Another college leader noted a lesson learned was not to include too many people early on in the process; they began with representatives from many departments and units, and it may have slowed the process:

> I think it's when the group was together. It's a lot of opinions. I think it would've been good to have a smaller group – maybe a representative fraction but just maybe not all the departments – and work through it and then move it to a bigger group. I think it took us six, seven months to get through – and for Clark State that's slow because we're usually – well, in my mind, we're usually pretty quick. If I want something to get done, we can get it done pretty quickly.

A smaller working group that ultimately answers to the faculty as a whole would also likely improve the speed of faculty review. However, it must be noted that there was an ad hoc committee early on; the structure may not have included enough/the right players to ensure that the product would go smoothly through the larger groups. While the strategy of the larger group may have slowed the process, in the end it may have facilitated its larger success. The PLA process also ballooned from an initial idea of PLA reform in the MET programs into a full schoolwide overhaul, which meant sacrificing some efficiency in favor of making a broader impact and achieving more cohesive reform.

The school plans to continue to reform the PLA process as they find hiccups in the new system. Currently, PLA requests made through the website go directly to the associate dean of academic affairs (ADAA), who serves as a central point person (prior iterations were less direct, but now the contact information is on the PLA website). The ADAA then forwards the student on to the dean of one of three academic divisions (Health, Human Services, and Public Safety; Arts and Education; or Business and Technology), with most requests coming to the Business and Technology division (some students may bypass the ADAA process if they are already in the AMCGE program and learn of PLA opportunities directly from the faculty, who were involved in the PLA task force). Students often need counseling through the process and may have some misconceptions, as one administrator described:

> There's still a lot of students that think that it's 'I'll just tell you about my work, and then you just give me credits.' And we really look at the integrity of the learning – it's a college level – and that we need to demonstrate that. That's through proficiency exam, or that's through portfolio. Or

> maybe there's a CLEP exam or maybe there's an industry credential. . . . So I talk them through that.

It is not clear if the ADAA will continue to be the point person in the future or if this role will shift to another administrator, but it is beneficial to have a direct report to the provost and vice president of academic affairs spearheading the effort while the school works out the kinks; she has the positional authority and links to faculty to ensure the process flows smoothly.

It is unclear at the moment how these credits might transfer to other Ohio institutions. The school worked with the Ohio Department of Higher Education, which is pushing for a more standardized process across the state that will articulate between colleges, but this is an ongoing process, and four-year schools have not all bought into it yet. For the time being, the ADAA tells students that if they are interested in pursuing bachelor's degrees in the future, they should be aware that there may be issues with transferring PLA credits and that they should check with their next institution on transferability. For this reason, it is important that current prices are also quite reasonable. The pricing structure was determined after studying policies at other area schools: $25 per credit hour plus any equipment fees (this is relevant in areas such as welding, where the student may use Clark State's materials to demonstrate proficiency). There is no processing fee.

PLA looks promising for students. Because the reformed PLA standards launched toward the end of the grant, we are unable to assess its efficacy with students in this report. However, interviewees were universally optimistic that students would benefit from the new, streamlined process. One faculty member noted that this should have a positive impact on students:

> For our students, I think it's gonna be huge for them . . . because I think they come with a set of skills and some of the things – for example, the TAA students we had not this past fall, the fall before, had worked in industry for 20, 30 years, and they're taking the manufacturing foundations class. Well, that I will say 80 percent of the class, they probably – it was good review for them. They may not have remembered, 'This is how you do this.' And 20 percent of it was brand new. But looking at it back – if we could've had a challenge exam, if they didn't know only 20 percent of the course but did 100 percent on 80 percent of the course, I would've still passed them in my regular class. So is that 20 percent critical for their steps forward, or would they be able to pick up that 20 percent later on?

Incumbent workers should also benefit from the revamped PLA. One faculty member discussed the value of PLA for enabling incumbent workers to come in and train up quickly, which will make workers more likely to pursue the programs. A few interviewees noted that the PLA will be particularly beneficial for the Applied Baccalaureate degree, to help students who come in with significant manufacturing experience accelerate their time to completion.

One note of caution moving forward is that the school needs to decide how to handle courses like Manufacturing Foundations in which students with industry experience may know

the bulk of the materials, but where I-BEST is an incorporated element that may be less familiar. This is an accident of having two major curricular reforms (PLA and I-BEST) that may bump into each other in the future and begs the question, are there certain courses students should take, no matter what?

Local employers have participated in curriculum development through the Employer Engagement Team (EET)and have helped to extend the curriculum into new areas. The EET has been very active, as will be discussed in further detail in the sections that follow. Employers have consulted with faculty and staff on curriculum and equipment, and they advocated for two key expansions to the Manufacturing Engineering Technology program: the addition of robotics arms to expand robotics classes in the program, and the addition of an Applied Baccalaureate in Manufacturing Technology Management. The addition of these curriculum elements expanded the skill base and career options of Clark State students and represents the school's cultivation of, and responsiveness to, local employer input on their programs.

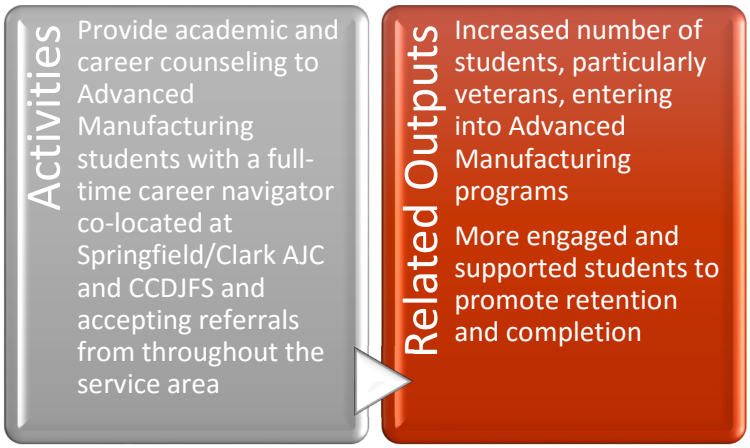
Co-ops that were once optional are now mandatory for the AS degree in engineering or applied technologies. In the past year, the newly defined co-op program lasts a full semester with a minimum number of hours for between 1 and 3 credits, which must be approved by students' faculty advisor, who also helps with the co-op coordinator to oversee and guide students in their co-ops. As the idea behind the co-op program is to provide students with an experience similar to that of applying, interviewing, obtaining, and working at a local job in manufacturing, it is also accompanied by a formal class to help coordinate and support their experience, and reflect on their time spent in the workplace of participating companies in the area. Administration is excited about how in many cases, students will stay on and become employed at the same company they did their co-op in after they graduate. In the past year, the colleges has had about 10 to 15 students go through a co-op. For a detailed description of Clark State's co-op program please see last year's report.

The priority for changing student data tracking systems shifted throughout the grant. Though the implementation of new tracking systems was not a part of the original TAACCCT statement of work submitted to the Department of Labor, when the logic model was first developed, the implementation team added this goal to their activities and expected outcomes. However, with turnover in Institutional Research leadership early in the grant term, this was no longer a school-wide priority. Current tracking systems through IR are extensive and well-maintained, and they provide sufficient information to meet the school's reporting and IR needs.

The original career navigator maintained an independent set of files that tracked her interactions with all students and included case notes. This system will not be maintained moving forward as the work of the navigator is largely folded into general advising, though it will be replaced with their existing tracking systems.

Career Navigator

In our interim reporting we noted that the navigator model was seen as a major success at the school, one that was instrumental in ensuring that students were recruited, retained, and successful completers. This model is not being maintained moving forward as-is, but rather spun out into general advising in an effort to begin scaling a more holistic advising model throughout the college.



Throughout the life of the grant, two individuals served in the navigator role, which shifted from a full-time to a part-time position. The original navigator left the school in August 2017 and was replaced by a part-time navigator from December 2017 through the end of March 2018. The second navigator has a history of working in manufacturing and had also worked in workforce development. At the time of our site visit, the second navigator was new, and therefore the majority of our interview subjects focused on the first navigator in their descriptions of the role; unless otherwise noted, the specific examples of the navigator that follow refer to the original navigator.

Students and faculty responded to the navigator role very favorably. At our 2018 site visit, one project leader noted, "I will still say this. I said this I think the first time we met. [The program] would not be the success that it is without having a full-time career navigator like we had." The sentiment was generally shared that having a full-time navigator at the beginning was instrumental to gaining momentum as a project and ensuring that students were recruited and retained. Faculty appreciated having a resource they could turn to when students disappeared from classes and felt that this was particularly important with their population of nontraditional students. One faculty member described the benefit, noting that there would be a period of adjustment as they moved to the new model:

> Little things like that, that if you didn't have somebody to take on some of those roles as the person – 'oh, yeah, I contacted those students. I registered those students.' She already has that relationship with them. And I think if we can continue that, that would be great. Now, I know the college is moving towards where we have certain general advisors for each program. So we'll see how that works when it – when we don't have a career navigator anymore.

In a focus group, students who had worked with the original navigator reiterated her value, describing her as "awesome" and a "go-to person." Asked to elaborate, students provided a variety of evidence:

> Get your schedule right the first time N and you don't have to worry about dropping classes because it wasn't – you know what I mean? – already filled up and she just didn't explain it. She actually took the time and looked and you went through your whole schedule to plan your whole schedule for the whole year.
>
> Yeah. I do have to say that my schedule didn't get put in right in my high school. Four years, they never got it right. What was the point of having that meeting if they never got it right?
>
> She did it on time…. A lot of people would just push your stuff, like, 'Oh I'll look into it,' and then they'll forget about it. But she would always work it.
>
> [She would] look into it and bring your information back to you.
>
> I told her I wanted to finish my engineering degree at Ohio State, so she went in and tried to see what classes I needed to get into it and match everything up. She did amazing. She did that right before she left, so she did not have to do any of the stuff that she did. She wasn't even my advisor. So I just went to her because I knew every single time I went to her, she got it done.

In addition to responsiveness to students, the career navigator was able to bring together a broader network of resources, in particular bridging the divide between the college and the local workforce system. From an organizational perspective, there had been structural holes, described by Burt (1992), which can lead to information disadvantages. Structural holes can describe silos within and between organizations, where groups are operating independently from each other and are not aware of each other's resources and information. The career navigator served as a network broker, building bridges across structural holes and providing three critical information advantages for students: access – having the information and knowing who will benefit from it; timing – knowing information at the right time, perhaps earlier than others; and referrals – acting as a personal advocate and broker in decision-making processes such as applications for aid. She was able to get students information about opportunities within different units of Clark State and with the Ohio Department of Jobs and Family Services (ODJFS). As a member of the Clark State community, she would refer students to the career services coordinator, who helped place them in internships and co-ops. As a member of the ODJFS staff, she knew the web of external resources available to support students in need. She also attended EET meetings and met with employers, serving as an information broker between students and employers (a role also performed by MET faculty, career services, and the project manager).

The career navigator helped strengthen the relationship between Clark State and ODJFS. The navigator role was always intended as a broker between these organizations, who jointly hired her with a physical co-location arrangement; she had offices in both locations and spent a small part of her time at ODJFS. The arrangement was viewed very positively by a representative of ODJFS, who noted her role in the program's success:

> The navigator, in my opinion, was really key, because…. a lot of times people will want to back out, 'Oh I just can't do this,' or 'It's really hard,' or they don't understand – just having that other

> person outside a faculty member that they can go to. Or 'I didn't eat last night because I didn't have any food in the house.' . . . And what [the navigator] did, she was on our payroll for a while, but then she came in and learned a lot of our programs. So they didn't have to refer them back to our agency. [She] had the knowledge that we had. She had applications. So they could complete the application for food, cash, medical here. [She] would bring the application over. We could get that processed.

The navigator had become a part of the ODJFS team and, armed with all the information and forms that they had, she was able to remove extra steps and make the process more manageable for students to receive outside assistance. Now that the navigator role is gone, there will be some period of adjustment as general advising expands its role to add in these wraparound supports. ODJFS is also going to have a bigger presence on campus. There will be a site on campus that can link students to wraparound services and perform referrals. There is a plan to add physical space to the college to accommodate that new location. Generally speaking, the relationship between the school and ODJFS is strong, as will be described later in the section on employer and workforce engagement.

Though the navigator role itself is gone, its functions have influenced general advising in ways that endure. Now that the bridges are built, school leaders described folding many of the elements of the navigator role into more general advising, including work with ODJFS and employers. The dean of student support, who oversees advising, described using some of the navigator-model strategies in trying to help students who were stopping out in other programs. This would include trying to connect with students and understand their issues holistically and trying to connect them to outside resources to help remove barriers to completion as part of a broader college-wide move toward the guided pathways model. So far, this model has been implemented in manufacturing, IT, and nursing, which will each employ a specialist in advising. He noted:

> We're borrowing a lot of that because, again, it's one of those initiatives that is not only statewide, but amongst all higher education, it's getting more to a model of the completion/retention piece, versus the number-of-students-in-the-seats type of thing. So using that model of making that specific connection, introducing [the concept of] career at the very beginning – we've done that through our new student orientation. Previously, students would come in, and we may mention it in our first-year experience class or whatever the case may be. But there really was not the initiative to get them to start talking about what is it you want to do when you leave here. . . . We're trying to implement many of those aspects into our general advising pieces there, so just getting students to realize that academics and career, they go hand in hand. And what we can do to help you, to keep you in the classes and things of that nature, we can – we'll do to the best of our ability, and the funds are available.

The original navigator provided in-house training to help advisors understand the career navigator approach and the broader package of wraparound services it entailed. As part of the college's broader involvement in guided pathways reforms, advising will now move to a success coach model informed by the college's experience with TAACCCT. In this model, coaches specialize in different programs in the school, but they also offer general advising and

some connections to wraparound services. The success coaches will have larger caseloads than the career navigator had. The new MET-specialized success coach was formerly an administrator in Business and Applied Technologies and understands the program based on that experience; she will also have general advising duties. The navigator shared her methods of tracking students, including going to classes to check on them and following up with students she had not seen in a long time. This aspect of the coaching is more difficult to maintain, as general advisors may cover programs with whom they do not share buildings and therefore they cannot necessarily locate or access their students easily. However, they are working to use emails and have faculty help ensure that students are aware of the support they can offer.

One barrier to maintaining a separate navigator was the expense of maintaining a very small caseload – as low as in the 200s. One school leader described the benefit, but noted the cost was out of reach without the external funding of the grant:

> Respondent: I think it's [our leadership has] been a tremendous model for the college. It's what advising – it's what I would like to see. Do I think it's replicable? Un-uh.
>
> *Interviewer: What's the hesitation?*
>
> Respondent: Well, the caseload that advising has is just not – they don't have the staff to be able to do it. But I think it's really inspired the college to look at that model, and they're trying to emulate it as best they can with the resources that they have. So it's been very successful.

While the caseload for success coaches will not be as small as the one the career navigator had enjoyed, the school is working to bring in more headcount to close that gap. One college leader estimated current caseloads were around 1000 students, but their ultimate goal was to get it to the 400s.

There is some concern about losing the navigator role, which was seen as critical to program success. One interview respondent worried:

> If there's anything that they need to keep out of this it's that career navigator position, because if you wanna – the programs will suffer. Point blank, the programs will suffer. The numbers will suffer. Maybe not forever, but they will. Because again, it's recognizing and meeting our demographic as individuals that need the extra help. They need someone watching out for them, because they're trying to look at their 60-hour-a-week work schedule, dealing with three or four kids at home, and then, 'Oh yeah, I need to schedule classes.' No. They need someone to call them up and go, 'Hey, I need you to stop in here when you got five minutes, I've got your classes set up, let me get you to sign this.' Great. And that person keeps going. Otherwise they're not. Because again, those barriers take priority because they don't have the time to devote. When we've got someone who is really working from all those individuals, who has – who gets out, knows the programs, knows what they're doing, that is really one of our key elements for this to continue to be successful.

One respondent thought the general advising takeover would go better if the specialist was physically located with MET:

> I mean, for all intents and purposes, we're separated. Students down here are rarely up in that end of campus. Most of what they're doing is down here. But it's truly that – the hands-on of the career navigator that has really made the difference.

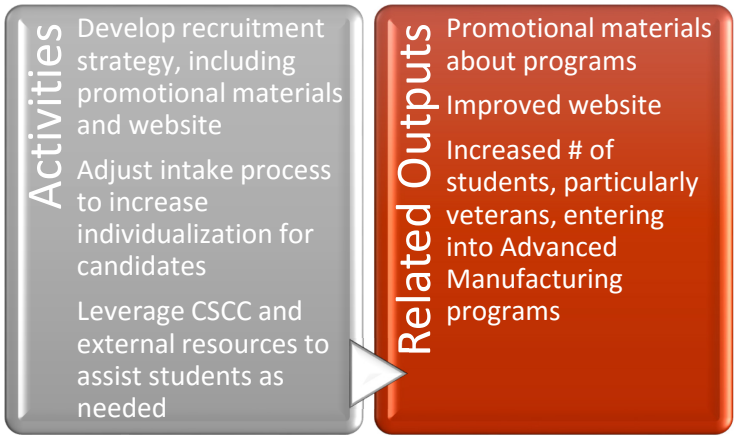
The previous time period without a navigator was challenging. The program went from August to December 2017 without a career navigator as they worked to replace the original navigator. In that time, general advising took over the work, while the MET faculty and staff worked with the TAA students, whose documentation needs they were better situated to address. This period without a navigator introduced some challenges, as one respondent noted, "I think it was difficult, individuals not knowing where they needed to go, who they had to talk to for scheduling. I think that wound up putting more on people's already full plates." Shifting the project manager to a part-time position did affect the delivery of career navigator services, as described by one leader:

> Well, I think it's affected the delivery in the sense that there's probably not as strong connection with Job and Family Service, just because of the time. And we had to reprioritize what was actually needed. And the biggest need was to make sure that the students who were coming in the pipeline or students who were existing in the pipeline were getting in the right classes, their schedules, just making sure that everything was kind of put together correctly for that. And also, our TAA students, making sure that they have all their documentation in order and things like that. So with only 24 hours, you have to – you just have to reprioritize your time. And Deb has an extensive manufacturing background, but she does not have an extensive academic background. So there was a learning curve there in learning the enrollment systems and how Blackboard works and scheduling and how that works as well. And getting her to network within the college about how we do things, which is very different from manufacturing.

Part of the challenge from this time period was likely due to the fact that it was not planned, whereas the post-grant loss of the navigator role had been anticipated and planned for a while. We also present these findings with the caveat that we cannot fully discern whether the impact of moving to part-time had a major effect on the quality of services; whereas the original navigator had two years to develop in the role, the second navigator had only two months to do so before our last site visit. These results do not necessarily reflect the likely path of the program under the guidance of a part-time navigator or once the navigator role is gone.

Recruitment

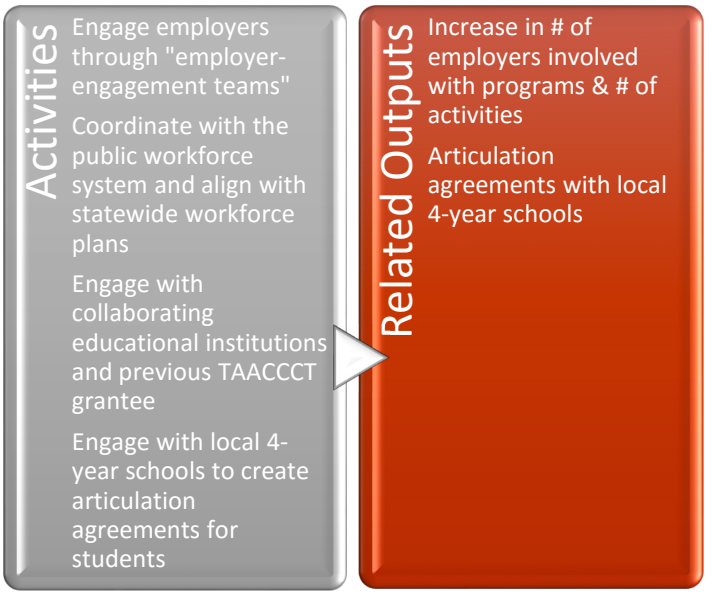
In the final year, attention shifted from recruitment (though recruitment efforts were ongoing) toward retention and completion. The recruitment strategy generally remained consistent with prior years, and the school is satisfied with the programs' intake numbers. The promotional materials and website improvements made in earlier years continued to benefit the program, and materials were continually updated as needed.



Veterans continue to receive priority in service for the MET programs. Though veterans were not as big a part of the MET student body as anticipated in the grant, the college continues preferential treatment for veteran applicants. Support continues through the college's Office of Veterans Services, which has an academic advisor who specializes in veterans' educational benefits.

Employer and Workforce Engagement

Employer engagement was a core goal of the AMGCE program, and a subject of great effort throughout the life of the grant by various faculty and staff throughout the college. Employer engagement at the school has been expanding as employers have become very involved with Clark State, serving on curriculum committees, giving presentations to students on what they are looking for in employees, and engaging in frequent communication with staff and students. Though these points of contact have expanded, employer communications have remained largely informal due to the school size and culture. Clark State is beginning to enjoy influence in the region with respect to manufacturing employment, which was demonstrated a variety of ways.



Though it engages employers in formal ways, Clark State remains largely informal in its approach to employer communications, focused on relationship building. As noted in our interim reports, employers have been engaged in a series of formal ways throughout the life of the grant, including advisory committees, formal presentations to classes, and internships and co-ops. In other words, because of this approach, employers are now participating on committees throughout the college and giving input outside of TAACCCT matters.

Employers regularly come into contact with faculty and staff at all levels and often interact with employers by phone or email, as described in Interim Report 2. However, there is no formal, campus-wide system for tracking employer contacts. Administrators generally keep their own records of whom they contact and do not necessarily coordinate with one another on employer relations; neither do they have a system for tracking all TAACCCT employer contacts within Clark State. For example, one administrator explained that she has her own tracking system of "affiliation agreements" as part of the co-op programs between students and employers, as well as with employers in general. She also explained that there is not yet a formalized employer-tracking process or database within the AMCGE program or the college, but that the Workforce and Business Solutions (noncredit) department or the college foundation has a system that one of the deans has access to. Emphasizing the importance of relationship building, another administrator dismissed this as a significant issue, stating:

> Clark State is small enough that we can get our arms around who's doing what, and we do a really good job at that. . . . We just constantly – we're on the phone. . . it really is so small that we can just talk to each other.

Generally speaking, this strategy works not only because of Clark State's size but also because of its culture. The school has a notably collaborative and collegial, all-hands approach to engaging with both students and employers. As noted in the Staffing section, a broad swath of Clark State has become engaged in the TAACCCT program, which enjoys support at the highest levels of the college. The team is in regular contact through formal and informal meetings, and the EET meetings are well-attended by faculty and staff, including administrators.

Expanded employer interest creates stronger opportunities for students and provides a model for other areas of the college. College staff is excited about the pathways that will open up to their students in the future, as this two-way engagement offers students consistent exposure to the companies they will hopefully be applying to for jobs and co-ops or internships. Career services at Clark State sends student resumes to employers directly, from which companies select students to interview.

Administration believes employer engagement with TAACCCT has significantly improved from the start of the grant. With the increased employer engagement and the opportunities it offers to students and the college, other areas of Clark State now have a model to emulate. As one administrator explained:

> We have relationships with our employers, and they'll give us advice on information, but the TAACCCT grant, really the employer-engagement team, really kind of upped the ante for us on that, and it's what we want to kind of develop in our other areas as well.

Clark State is expanding its MET offerings to include four-year degrees in response to employers' requests. Employers helped influence the start of an applied baccalaureate degree program in manufacturing technology, which is part of a larger initiative to meet local industry demands. This program was a direct outgrowth of the work conducted with employers through TAACCCT; at that time, employers reported that they needed more workforce that had the business skills to serve as management and had the specialized knowledge of manufacturing required to excel in the role. When the college sought to compile an application to the state to offer this degree, the employers who had been involved in the grant were very engaged in supporting this effort. Employers valued the baccalaureate because it would allow them to send their incumbent workers to Clark to get a degree to help with their career advancement. An administrator explained that the relationships built with employers under TAACCCT, along with the physical materials acquired, were among the grant's most significant, sustainable outcomes:

> You can see how our relationship with the TAACCCT grant has enabled us to really . . . . I mean I don't think we would've been able to pull this off without having TAACCCT, because of all of the infrastructure, the equipment we bought. But it's really the relationship building that helped us.

Similarly, another administrator touted the beginning of the applied baccalaureate degree as an outgrowth of the TAACCCT grant and their efforts in meeting employers and industry needs:

> And the employers – I mean, to have the number of employers engaged in those conversations that we did, that's only possible because of the work that was done with the TAACCCT grant. We wouldn't have that program in if not for that. And obviously, if that many people are around the table saying, 'Yes, you're doing a really good job. I want to see it go further. I want to see you offer an expanded degree. I think that speaks volumes to what that grant has done.

The applied baccalaureate program recently received approval from the state of Ohio. Many at the college are excited for the opportunities it will bring for students and the community. In public testimony supporting the degree program, the college president highlighted the teamwork between employers and the faculty and administration at Clark in its development:

> The purpose and value of the degree lies outside the organization, with our employers, and not inside the college, as defined by administrators and faculty. Clark State's student and employer-centered approach to this degree adds value to our manufacturing business partners – our customers – by offering a program and curriculum designed for and by these customers in collaboration with Clark State faculty…all of our industry who have supported our manufacturing programs at all levels – whether it's a single manufacturing course, a certificate, our associate's degree, or this applied baccalaureate degree – our partners have created the content and

curriculum that we teach, and we are grateful to you in ensuring that our programs align with the skills you need.

The President specifically cited the fourteen employers who have written in support of the four-year program and committed to sending 79 students to earn the degree in the first two to five years. She also discussed details of baccalaureate degree, based on the characteristics of the future manufacturing workforce and the skills they will need to perform well in industry:

> Perhaps the single most distinctive feature of Clark State's applied baccalaureate degree is the students we are serving. This program is designed for the incumbent worker rather than the newly graduated high school student. The prospective students for this program are currently working in manufacturing, and are challenged with making a difficult decision: do I go back to school for a degree that may not exactly match the skills I need to be promoted at my company, or do I stay in this current position?... Current degree programs do not provide the flexibility or the hands-on training required to add value for their employers immediately… [Employers] are confident that our students/their employees will get the training they know will result in efficiencies, increased productivity and profits, as well as fill workforce shortages due to retirements and new positions

As expressed in the President's testimony, there are numerous members of industry that have facilitated the creation of this new degree, some of whom have written testimony in support of it. For example, the Dayton Region Manufacturers Association stated that it:

> supports Clark State Community College in its efforts to create a Bachelor of Applied Science in Manufacturing Technology Management. We believe that this degree will have a great impact on the manufacturing industry in the Dayton Region and on the community as a whole, providing employers with skilled employees and providing workers with the education they need to find good, local jobs.

Another local company also offered strong support for the program, and went as far as saying that it would help create a necessary boon in labor supply for the local manufacturing industry as whole, stating:

> The Manufacturing Technology degree proposed by Clark State is a dream come true for many businesses in our area starved of a trained and competent workforce. Successful completion of this coursework will provide dream candidates for us to hire in our businesses. These students will be fought over by many companies in dire need of employees with the technical skills and management training required to provide leadership on the shop floor and beyond. We are excited and we remain hopeful in the prospect of hiring graduates with a degree like this one.

Other employers are excited about the prospects of the program providing continuing education and training for their current workforce with emphasis on leadership positions, according to one company's testimony:

> The potential addition of the Bachelor of Applied Science in Manufacturing is an exciting option and could be an excellent source of continued education for our internal workforce, specifically our leadership team. We are a growing company, so educational opportunities close to home are

> essential for our full-time employees to ensure they can balance work, expanding their education, and their home lives. We are dependent on the talent we can retain and the opportunities we can offer. We have no doubt this new educational option will be a direct resource for our employees and our growing talent needs.

However, not all members of the community are supportive of the program; specifically, other colleges and universities object to its formation. For example, the University of Akron, Central State University, and other schools believe that this degree duplicates other existing programs at other schools, while others believe that it is not the role of a community college to offer a four-year program. Yet, despite some critics, over 25 local industry organizations, including manufacturing companies, provided positive testimonies for the new baccalaureate degree and the state approved the degree program in May 2018. The degree is planned to begin in Fall 2019. This expansion of the TAACCCT program, with the vocal support of local employers, is a strong sign that the MET program is working well and supporting positive change in the community.

The grant's employer outreach efforts are laying the groundwork to serve regional manufacturing industry needs. Employers are continuing to have issues meeting their recruitment needs despite the college's efforts to improve their industry network and pathways through co-ops (which many employers are excited about and helped promote) and the fact that some employers do offer tuition assistance for bachelor's degrees in engineering (which is what companies reported looking for in applicants as an assurance they have aptitude in an industrial area). Employers have reported that they are familiar with the features of the college's manufacturing technology program, including its co-op and use of advanced equipment, and want to build connections. Last year's report documented how local employers in the manufacturing industry thought that co-ops were an important element of the program and expressed great interest in hosting students so they can gain invaluable hands on experience and be better prepared for manufacturing jobs. An administrator stated:

> We have a good amount of employers who are looking for assistance. I mean, the economy right now is on the rise, the unemployment is low. Employers are really looking to develop that pipeline. They're very open to co-ops and internships.

As administration has taken this employer input and expanded co-ops, the next goal for both the school and employers is to fill this pipeline with Clark State students and use it to fill positions that local companies currently have open. As one administrator explained:

> A lot of times we have employers contacting us saying, 'We're – we need help. How can we develop a partnership?" And this is the best way [to get employees] because by the time our students graduate, they're already employed. So the employers need to get to the students while they're still in school, in the co-op and internship program.

The competition this respondent described for graduates indicates that Clark State is not yet able to fully address employers' labor shortages, and should they expand capacity, employers

are ready to hire. However, expansion must be undertaken cautiously, and the shortages present a good opportunity for Clark State to influence job quality in the area (as discussed further below).

The employer engagement strategies of the college have positioned the college to be a responsive partner to industry. One employer described that their engagement with them is "perfect", and that it was on the industry end from which the engagement and relationship might be lagging, mainly due to time constraints for industry engaging with the college. A significant challenge for engagement is the constantly changing manufacturing industry. Mainly, the technology advances faster than Clark's curriculum, or that of any school, college, or organization, can keep up. An administrator reported:

> I think anytime it's a challenge to be able to quickly adapt to the changes in industry, because you've got this curriculum, and you need to quickly adapt because this new industry is coming in or this new process is being implemented… But I think that's always the challenge – making sure that you are – it's really hard to change for jobs that don't exist. So I think that's always going to be our – any institution's challenge.

Another college administrator reflected on the college's ability to listen to employers to respond to industry needs:

> One business told me, 'I like Clark State because I tell them what I want, they don't tell me what I want.'… And we have those relationships where business is coming in talking to our students, who are going out and being engaged in what the business is doing.

Clark State has begun lobbying employers on behalf of its students. In addressing regional shortages for employers, it is appropriate for Clark State to require employers to uphold their end of the bargain in supplying quality jobs for graduates. As part of broader regional development goals, the school has been discussing wages with employers, an issue discussed in last year's report. Although Clark State has required companies to pay students for their time during co-ops, the wages are still an issue with some employers – both for co-ops and after graduation when students enter the labor market. Administration has approached this by arguing that Clark State is building a workforce and becoming part of the industrial community – essentially creating an alliance to improve the region, which has implications for how it can approach employers. One administrator explained:

> I've said to everybody, you need to raise wages… You're not paying. I mean, I can't ethically put a student through our welding program in a certificate and she works in welding for nine months and she comes out and she makes $12 an hour. It's not going to work that way…The way this works is that we build a community together. The only way you're going to build is if you give them a middle class wage…and that's called an alliance.

Another administrator expressed similar feelings, referencing the services Clark State is investing in and consequently providing to the industry, and how employers should be

contributing as well in the name of fair wages, which will produce results that can benefit the entire community:

> We said if we're going to commit dollars and cents to get these individuals – employers, they need this. They need welding. They need the soft skills. They need this. We're building this. We are creating this program and we're investing, so if you're going to hire them, are you going to hire them at the same rate of pay you would somebody that didn't go through the program?... Because we want people – we want to reduce public assistance and create opportunities because it's going to stimulate the economy.

According to an administrator, many employers agree with this statement, but still may be cautious about the relationship. The same administrator spoke of a meeting with employers:

> Everyone – I think we had 30 employers that day. They all agreed [about greater compensation for graduates]. And these are CEOs of large companies, small companies, midsized companies. But they all agreed. Now, what's interesting, because we're doing this and we're seeing the value of the product, after they go through the training, we have had some employers that a little, I guess, put off because now they're forced to increase. But otherwise, these individuals are leaving their companies and maybe going to another employer. And unfortunately, people will leave a job for 25 cents on the hour.

Clark has worked closely with the workforce system and other external organizations, such as the Chamber of Commerce, to help promote the local manufacturing industry. Another sign of Clark State's local influence has been its work with the Chamber. For example, there has been significant coordination between Clark State and the Chamber of Commerce to lure local manufacturing business to the area. One Chamber administrator talked about two companies specifically: "I don't think we would have landed those two companies in Springfield without our coordination with the Springfield Chamber and the workforce readiness [college's noncredit workforce training department]." Another administrator explained that representatives from the Chamber flew down to visit one of the two companies that was originally located in Alabama, and noted that the collaboration between industry, Clark State, and the Chamber helped convince the company to locate their new facility near Springfield. The local job center played the role of lead recruiter, holding information sessions for the company, and expressing that Clark State was able to provide the training to meet the company's needs. In addition, the college worked closely with their hiring team and the Chamber, and allowed the company to use college facilities for recruitment and training.

STUDENT OUTCOMES EVALUATION

The student outcomes study is presented in two parts. In the first part, we conduct a descriptive analysis of the TAACCCT students' educational and employment outcomes, using student administrative data and data from the Ohio Department of Jobs and Family Services (ODJFS). In the second part, we use quasi-experimental techniques (propensity score matching) to evaluate the impact of TAACCCT participation on MET students, focusing on their academic

performance and outcomes.[4] To do this, we compare TAACCCT students to a similar population of students at Clark State – those in Information Technology programs – who are used as a non-TAACCCT-touched control group. As each set of analyses have a unique methodology and incorporate different data, we present the parts separately.

Both components of the student outcomes evaluation draw on administrative data for TAACCCT students. To qualify for this sample, Clark identified a "TAACCCT student" as any individual who enrolled in at least one TAACCCT-touched course,[5] or registered as an MET major, during the study period (Fall 2015 through Fall 2017). This timeframe was selected based on implementation activities; Clark's TAACCCT program introduced three key elements that affected the learning experience: the addition of a career navigator, the redesign of several manufacturing courses, and the installation of equipment for hands-on learning. Although the grant began in Fall 2014, the true launch of the MET reforms happened in Fall 2015 due to the planning process, the time it took to acquire and install new equipment, and the longer-than-anticipated process of hiring a program navigator.

For some analyses, we have divided the data into classes: the 2015 Class includes those students whose first TAACCCT exposure was in Fall 2015, Spring 2016, or Summer 2016. The 2016 Class includes those students whose first TAACCCT exposure was in Fall 2016, Spring 2017, or Summer 2017.

Part I of the student outcomes evaluation presents a quantitative analysis of Clark State TAACCCT students' enrollment patterns, demographic characteristics, and academic and employment outcomes. We will discuss our findings in terms of three broad domains:

- *Student enrollment and demographics*: TAACCCT students' sociodemographic background (gender, race/ethnicity, age), registration status at first enrollment, financial aid status, and military background.

- *Academic achievement*: TAACCCT students' completion outcomes, number of credentials earned, time elapsed from initial enrollment to first credential, and retention rates.

- *Employment*: Employment outcomes for program completers including their employment rate and their average wages.

In Part II, we present a quasi-experimental analysis using propensity score matching with observational data to examine TAACCCT's influence on students' academic achievement in

[4] For an overview of the programs included, see Appendix B (MET) and Appendix C (Information Technology).

[5] One course, INT 1000 (a ten-hour OSHA safety course), was excluded as a qualifier for this analysis. Though it is a requirement for all TAACCCT certificates and degrees, this course is also a requirement for several other programs at Clark State. All other courses in the certificate programs are included in this sample.

terms of graduation, retention, and earned credits during the follow-up period. We isolate these effects from any possible interaction with previous experience at the college by limiting our sample for this analysis to first-time students at Clark State. In collaboration with the Clark State implementation team, we identified IT students as the student population that was most similar to the MET students.

The aim of this analysis is to address three important questions involving the effects of Clark State's TAACCCT program:

- *Student retention*: Did TAACCCT students have better retention than their counterpart non-TAACCCT students in the Information Technology (IT) program? To address this question, using two retention measures: the immediate retention rate and whether students retained for the majority of semesters in the follow-up period.

- *Completion rate*: Did TAACCCT help students stay engaged in school and achieve their credentials? Were degree and certificate completion rates higher for TAACCCT students than they were for IT students?

- *Credits earned*: Among those who had not graduated, did TAACCCT students earn more credits than their counterpart (non-TAACCCT) IT students?

Part I: Descriptive Analysis

Methods

Data for this final report were pulled from administrative and workforce data sources by Clark State Institutional Research in the spring of 2018. School administrative datasets provide current and historic academic history on course registration, credit-earning outcomes, and graduation outcomes. Over the study period (Fall 2015 through Fall 2017), we identified a total of 397 students as Clark State TAACCCT students. The data includes student registration information, course history (including course credits attempted and earned), and graduation information. It also includes students' self-identified demographic information – e.g., race/ethnicity, gender, age, disability status, military experience – as well as financial aid status (using Pell eligibility as a proxy). Employment data were received in the summer of 2018 through special contract with the Ohio Department of Jobs and Family Services (ODJFS).

Measures

The population of TAACCCT students was determined by Clark State using major, core courses, and major code. Between Fall 2015 and Fall 2017, 397 unique TAACCCT manufacturing students were identified. This count includes students who were already at Clark State prior to Fall 2015.

Since there were few American Indian, Asian, Hispanic, or international students, and few students reporting two or more races, we combined these categories into a single *other race* category. Age of the student was defined by the student's age at the time of their first enrollment in a TAACCCT course and was calculated using his/her date of birth. Students age 25 or older were considered *non-traditional* students, and those under 25 were *traditional* students. *Veteran* students include both those with military experience and the spouses of veterans. *Pell eligibility*, documented in the administrative data set, served as a proxy for financial status. We created the variable representing students' *registration status* (enrolled full time or part time) based on the DOL definition of full-time students: those taking 12 or more credits in the Fall or Spring terms, or 6 or more credits in the Summer terms. Students taking less than 12 credits in the Spring and Fall terms or less than 6 credits in Summer are part-time students. In all analyses, a students' registration status is the status under which they were registered in their first term during the observational period.

Students' *academic performance* data were retrieved through the Fall 2017 term. We calculated the earned credits for each student over time: If a student earned a grade of D or above, s/he would be considered as having earned the course credits. Students were counted as retained in school to pursue their credential using two measures: (1) if they remained registered for any course in the semester subsequent to their first TAACCCT enrollment, and (2) if they remained registered for any course in any two semesters of the three subsequent to their first TAACCCT enrollment.

Results

This section focuses on providing descriptive results on TAACCCT participants. We begin with a discussion of the demographic characteristics of all students enrolled in TAACCCT programs. Next, we examine academic outcomes, discussing retention and graduation rates as well as the numbers of credits earned by TAACCCT students. Finally, we turn to a subsample of TAACCCT students for whom we have two-year data – those first enrolled in Fall 2015 or Spring/Summer 2016 – to examine their experiences given the longer period of time that has passed since they began their relationship with Clark State.

Program enrollment and participant profile

Over 200 students participated in TAACCCT in any given year. Table 3 presents the number of TAACCCT students in MET programs in the 2015, 2016, and 2017 academic years. As we only have data for the fall of 2017, it shows a lower enrollment number than the previous year, but it appears that year was on track for a similar, if not larger, enrollment than its predecessor. These are not unique participant counts; they reflect how many students were in the program at each point in time. Thus, students could be counted in multiple years if they continued their study across academic years in pursuit of their credentials.

TABLE 3. TOTAL TAACCCT ENROLLMENT BY YEAR

Class Year	Total TAACCCT enrollment in Manufacturing Engineering Technology
	N
2015[1]	220
2016[2]	228
2017[3]	131
Total	579

[1]Includes semesters: Fall 2015, Spring 2016, Summer 2016
[2]Includes semesters: Fall 2016, Spring 2017, Summer 2017
[3]Includes Fall 2017 only
Source: Clark State Community College Student Administrative Data

There were 397 unique participants in the sample. Table 4 presents the number of students who first enrolled in the TAACCCT program in each academic year. There were 220 TAACCCT students in MET programs in the 2015 academic year. In AY 2016, 133 additional students enrolled in TAACCCT programs, and Fall 2017 brought an additional 44 enrollees. As this table does not exclude students who were already at Clark State prior to the implementation of the TAACCCT program, it is unsurprising that the first class is so large compared to the second – all students previously enrolled in MET programs would have been considered "new" enrollees in the TAACCCT-touched versions of their existing programs that year. When considering these data, it is also important to remember that the 2017 data only includes one semester, compared to the three semesters in the AY 2015 and AY 2016 classes, so the smaller number in 2017 is to be expected.

TABLE 4. UNIQUE PARTICIPANT ENROLLMENT OVER TIME

Year	Students beginning enrollment in Manufacturing Engineering Technology TAACCCT	
	N	% of total TAACCCT sample
AY 2015[1]	220	55.4
AY 2016[2]	133	33.5
Fall 2017[3]	44	11.1
Total	397	100.0

[1]Includes semesters: Fall 2015, Spring 2016, Summer 2016
[2]Includes semesters: Fall 2016, Spring 2017, Summer 2017
[3]Includes Fall 2017 semester only
Source: Clark State Community College Student Administrative Data

The demographic characteristics of Clark State's TAACCCT enrollees are presented in Table 5. Among the 397 unique MET students, the majority of them were male (89.2%). Most of the students were white (76.3%), just over a tenth were black (11.1%), and there were very few

students of other racial backgrounds (8.3%). Over 40 percent of TAACCCT students received financial support (41.3%). Few of them had a military background (10.3%). Nearly a third (71.8%) entered the TAACCCT program as part-time students, and more than half (55.9%) of them took developmental education replacement courses during the study period. Over half (54.4%) of MET students were nontraditional (25 years of age or older). Compared to the general Clark State student population described in the Local Context section of this report (Table 1, Page 3), TAACCCT students were more often full-time students (36% of TAACCCT students compared to 20% of the overall school population) and were more likely to fall into the nontraditional age group (54% of TAACCCT students compared to 38% of the overall school population).

TABLE 5. STUDENT CHARACTERISTICS

Trait	N	% of TAACCCT students
Gender		
Female	43	10.8
Male	354	89.2
Race		
White	303	76.3
African-American	44	11.1
Other	33	8.3
Not reported	17	4.3
Financial aid		
Pell Eligible	164	41.3
Military background		
Veteran or veteran spouse	41	10.3
Registration status		
Full-time student	143	36.0
Part-time student	254	64.0
Developmental Education status		
Taking developmental course	222	55.9
Age		
Non-traditional student (25 and older)	216	54.4
Traditional student (Less than 25)	181	45.6
Total number of students	397	

Source: Clark State Community College Student Administrative Data

Academic Progress

TAACCCT students earned a total of 119 credentials between Fall 2015 and Fall 2017. One important goal of the TAACCCT program was to improve the rate at which students complete credentials (certificates and degrees). Forty-eight MET students in the 2015 class and 10 in the 2016 class earned credentials. Table 6 presents the number of associate degrees and certificates earned by students in these two cohorts as well as the time lapse between students' first TAACCCT enrollment and their completion date.

It is not surprising that the 2015 class earned most of the credentials – they had the most time in the data set. The majority of the associate degrees and certificates were awarded within one year of students' first TAACCCT enrollment. Because this data set does not exclude students who had been enrolled at Clark State prior to the study period, some students in the 2015 class may have been working on their education for multiple terms when they entered the TAACCCT pool – in fact, 19 of the 48 students in the 2015 class had earned credits in MET programs prior to becoming TAACCCT students. Interestingly, however, none of the credential earners in 2016 had earned any credit in their subject area before joining the TAACCCT program. Few of the credentials were awarded after two years, which is due to the low number of students in the sample who have more than two years of data (only those who entered TAACCCT in Fall 2015).

TABLE 6. NUMBER OF CERTIFICATES AND ASSOCIATE DEGREES EARNED BY MET STUDENTS, BY TIME BETWEEN FIRST TAACCCT ENROLLMENT AND COMPLETION

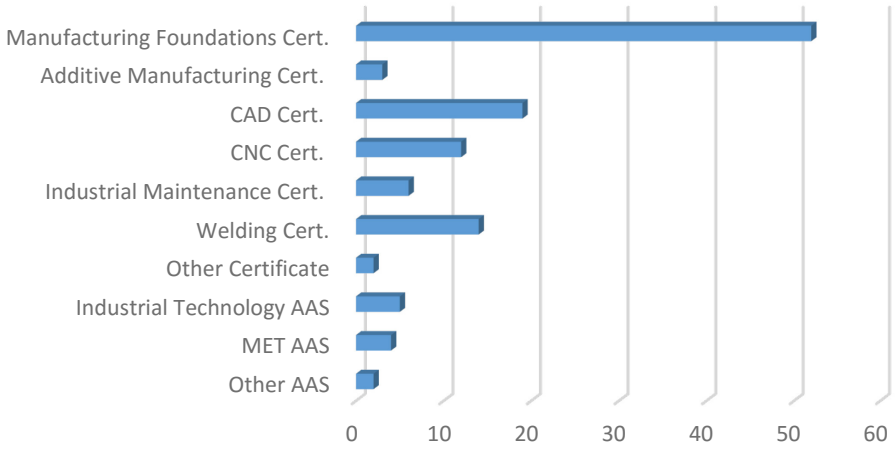
Time between TAACCCT enrollment and completion	AAS		Certificate	
	2015 Class	2016 Class	2015 Class	2016 Class
Within 1 year	7	1	20	10
Between 1 and 2 years	5	1	69	2
After 2 years[1]	4	0	0	0
Total	***16***	***2***	***89***	***12***

[1]Applicable for students who entered in the Fall 2015 semester only.

Figure 2 demonstrates the distribution of credentials by type. Among the aforementioned 119 credentials, the majority (N=52) were Manufacturing Foundations certificates, which are embedded in all MET certificates and degrees. The next most popular credential was the CAD certificate (N=19), followed by the Welding certificate (N=14) and the CNC certificate (N=12). Students split relatively evenly between the MET AAS and the Industrial Technology AAS (N=5 and N=4, respectively).[6]

[6] A complete count for each program is provided in Appendix D.

Figure 2. Number of credentials earned by TAACCCT students, by credential type (Fall 2015 through Fall 2017)



To understand students' pathways, we examined their employment outcomes. TAACCCT MET students were expected to get employed upon program completion with the help of the program navigator as they were well trained in manufacturing techniques and had hands-on experience of using industry-specific equipment. Following DOL's guidelines, we defined employment status by whether the student earned any income in the first year quarter immediately following their program completion. Since 73 of the 397 TAACCCT MET students were already employed when they first enrolled in the TAACCCT program, we focused on those who were not employed at the beginning (N = 324). See Table 7.

Among the 324 TAACCCT MET students who were not employed when they started the program, 46 completed the program. Fifteen of them finished an associate degree and 31 of them earned a certificate. Among the students who earned an associate degree, 4 (26.7%) were employed in the first quarter after graduation. They, on average, earned $8,704.8 in the year quarter. Although 18 out of the 31 certificate earners (581%) were employed upon graduation, they, on average earned a $1000 less than those completed associate program. They on average earned $7,712.2 in the year quarter.

TABLE 7. EMPLOYMENT OUTCOMES ONE QUARTER AFTER COMPLETION OF MANUFACTURING GRADUATES

Employment upon program completion	AAS	Certificate
% Employed	4 (26.7%)	18 (58.1%)
Average 1st quarter wage	$8,704.8	$7,712.2
Number of students	15	31

Source: Ohio state wage records data from ODJFS

Pathways of First-time Students Enrolled in TAACCCT

We examined the pathways of those who were first-time students upon enrollment in TAACCCT. To understand their pathways in the program, we examined two important academic outcomes: earned credits and retention (measured by registration status in one-year and two-year periods following entry into in the TAACCCT program). In this section, we focus on all TAACCCT first-time students[7] who have information sufficient to calculate one-year outcomes (those enrolled between Fall 2015 and Spring/Summer 2017[8]), then we focus in on just those students who have information sufficient to calculate two-year outcomes (the 2015 class, which includes all students enrolled between Fall 2015 and Spring/Summer 2016). As the sample is limited to first-time students, the total sample size for this portion of the analysis is 247 students.

Progress Along Pathways at One Year

On average, students completed approximately one full semester's worth of credit in their first year of TAACCCT exposure, though it took more than one semester to achieve that. Table 8 shows the earned credits and number of enrolled terms for the 247 first-time TAACCCT Engineering students in the year after their first TAACCCT exposure. In the year immediately following their first TAACCCT enrollment, students earned on average about 12 credits, and a little less than half of those earned credits were for courses in the MET program. On average, in one year, these students remained registered at Clark State for over 1.6 semesters.

The majority of TAACCCT students complete a credential or are retained in the first year after TAACCCT exposure. Student completion is an important output for the TAACCCT program. To examine the short-term output, we examined students' status at the conclusion of the first year of program participation. The results are presented in Table 8. In the year since beginning participation in the TAACCCT program, 5.7 percent (N= 14) of the 124 engineering students in the 2015 and 2016 classes completed either a certificate or an associate degree. The majority of students were retained (N=136, 55.1%) after their first TAACCCT semester. Around 39 percent (97 students) stopped out after their first TAACCCT semester and did not return within the two-year timeframe.

[7] First-time students are those who were out of school for at least one year before their first TAACCCT enrollment.

[8] For all analyses, we combined the registration status of the Spring and subsequent Summer semesters; if a student was enrolled in either, s/he was included in the combined count. Two outcome timeframes are examined. For one-year outcomes, the analysis includes the first semester of enrollment and the subsequent semester (e.g. for Fall 2015 starters, this includes the Fall 2015 and Spring/Summer 2016 semesters). For two-year outcomes, the analysis includes the first semester and the following three semesters. For Fall 2015 starters, the three following terms include Spring/Summer 2016, Fall 2016, and Spring/Summer 2017. For the Spring/Summer 2016 starters, the three following terms include Fall 2016, Spring/Summer 2017, and Fall 2017.

TABLE 8. ACADEMIC PROGRESS AMONG FIRST-TIME ENGINEERING STUDENTS IN THE FIRST YEAR OF TAACCCT EXPOSURE (2015 AND 2016 CLASSES, N=247)

Enrollment	Average (Range)
Average total credits earned	12.1 (0 – 53)
Average total credits earned in MET	5.3 (0 – 37)
Average number of terms enrolled	1.6 (1 – 4)
Academic outcomes at one year	
Students who completed certificate or degree	14 (5.7%)
Retained students (enrolled any term after first)	136 (55.1%)
Students no longer enrolled	97 (39.3%[1])

[1]Percentages do not equal 100 percent due to rounding
Source: Clark State Community College Student Administrative Data

Progress Along Pathways at Two Years

We were able to track longer-term outcomes for the 2015 class as well, allowing us to examine whether students remained on these pathways. For this incoming cohort, we gained access to data covering a full two years' worth of semesters for 156 first-time students enrolled in TAACCCT. Table 9 presents the earned credits and number of enrolled terms for these students.

Students in the 2015 class earned, on average, approximately 17 credits in the two-year timeframe following their first enrollment, representing about 5 credits more than the average one-year outcome. Just fewer than half of the earned credits (8 on average) were for MET courses. In terms of retention, students in the two-year analysis remained registered in Clark State for an average of two semesters following their initial enrollment.

The majority of TAACCCT students complete a credential or are retained in the first two years after TAACCCT exposure. To explore how well the TAACCCT program helps students stay engaged in school, EERC examined students' registration status over time. The results are presented in Table 9. About 33 percent of students (N=52) stopped out after their first TAACCCT semester and did not return within the two-year timeframe. However, just a little less than half remained registered (N=76, 48.7%). Those retained students either continued their studies in the semester immediately following their first TAACCCT course (N=69 out of 76, or 90.8% of those retained) or re-enrolled after skipping one term. Almost 47 percent (36 out of 76) of retained students re-enrolled for two or more semesters after their first TAACCCT term.

Overall, this indicates that many students complete their first certificate or degree in the second year following their first TAACCCT enrollment rather than their first; while only 6 percent achieve completion in the first year, 15 percent have achieved completion by the end of the second year. Predictably, fewer students are retained at Year 2 than at Year 1; about 49 percent of students remain enrolled at 2 years, compared to 55 percent at one year. However, it

is also true that fewer students stop out as of their second year; 33 percent of students stopped out at their second year, compared to 39 percent of students who did so in their first year. This indicates one of two things: Either the 2015 class had more stop outs to begin with and the first-year average was pulled down by a very active 2016 class, or students who had stopped out in their first year returned the following year to continue their education.

TABLE 9. ACADEMIC PROGRESS AMONG FIRST-TIME ENGINEERING STUDENTS IN THE FIRST TWO YEARS OF TAACCCT EXPOSURE (2015 CLASS, N=156)

Enrollment	
Average total credits earned	16.7
Average total credits earned in MET	8.0
Average number of terms enrolled	1.9
Academic outcomes at two years	
Students who completed certificate or degree	28 (17.9 %)
Retained students (enrolled any term after first)	76 (48.7%)
Students no longer enrolled	52 (33.3%)

Part II: Quasi-Experimental Analysis

In this section, we present analytical results from a quasi-experimental analysis of propensity score matching to evaluate the impact of the TAACCCT grant on Clark State Engineering students who were in the program for the first time between Fall 2015 and Fall 2017. We focus on three academic outcomes – completion, retention, and credits earned.

Method

Propensity score matching has become a popular approach to estimating program effects using observational data. In situations such as educational training programs, where randomization is unethical or impossible, propensity score matching has become a widely accepted way to account for bias in the outcome effects introduced in the treatment selection process. It accounts for the conditional probability of treatment selection as a means to reduce bias when comparing program outcomes between treated and control groups. The propensity scores are estimated using all the variables that are related to the outcome of interest and serve as balancing scores to create matched treated and control groups similar to what researchers would achieve under randomized control trials. The matched treatment and control groups are similar except for their treatment status.

Sample

The treatment group consists of the 397 students who entered the TAACCCT Engineering program between Fall 2015 and Fall 2017. To prevent the presence of prior college experience from potentially influencing students' current academic performance, we restricted this part of

our analysis to first-time students – those who were not enrolled at Clark State in the prior cohort year. After removing subjects with prior college experience from the sample, the treatment group consisted of 305 first-time students. We further restricted the data to those containing values for each outcome of interest. (See Appendix D table 1 for sample size for each variable).

The control group consists of 781 students who enrolled in Information Technology (IT) courses between Fall 2013 and Fall 2017. Though the timeframes for the two comparison groups do not fully match up, the higher number of semesters in the IT students' dataset was intended to help us construct a larger control group; this would make it easier to create a proper match for the students in the treatment group. As with the treatment group, we focused on first-time IT students (N = 547) who were not in school in the prior academic year. Data were further restricted depending on the outcome under study. (See Appendix Table D-2 for sample size for each variable).

Outcome of interest

There are three important academic outcomes, and each were examined within one-year and two-year frameworks – completion (completion within 1 year, completion within 2 years); total credits earned (within 1 year, within 2 years); retention (immediate retention, and a measure of long-term retention: the rate of retention in school for more than 2 terms in the 2 years after first enrollment). The graduation and retention outcomes are categorical variables with 1 indicating endorsing the item, while the total credits earned variables are continuous.

We created samples for each of the one-year and two-year outcomes. The samples used for each outcome analysis are presented in Appendix Table D-3. For each of the one-year outcomes, the cohorts were followed up for one academic year (including the starting semester), and for each of the two-year outcomes, the cohorts were followed up for two academic years (including the starting term). The immediate-retention outcome examines the registration status in the immediate next term[9].

Covariates

In this evaluation, the variables used for matching are those that have been demonstrated in the educational literature to be associated with academic outcomes. They include students' sociodemographic characteristics such as gender (male), race/ethnicity (black, other racial group, and white as reference group), age/traditional students, and financial aid conditions using Pell as a proxy. Students' military experience, their academic ability (whether taking replacement courses), and registration status of whether they were full-time or part-time students are also considered. The distribution of the covariates for the treated and the control groups are presented in Appendix Table D-2?).

[9] For members of both the Spring and Summer cohort, the immediate next term is considered to be the following Fall term.

These variables are all categorical variables with 1 indicating endorsing the item. Demographic information was self-reported, while financial aid, military background, and academic information was tracked by the administrative database.

Statistical analyses

We estimated the propensity score using the covariates that are theoretically related to the academic outcomes. Then we matched the TAACCCT Engineering students to the IT students based on the propensity scores. The propensity score matching procedure minimizes the baseline differences between the TAACCCT and non-TAACCCT group. We used the 1:3 nearest neighbor matching procedure with a caliper of .01. After matching, a logistic regression model was applied to predict the probability of receiving treatment (TAACCCT) using the baseline covariates. The extent to which propensity score matching reduced the differences between the TAACCCT and the IT group was assessed by comparing the standardized differences in the average covariates value prior to and after the matching. Finally, we used the robust Abadie–Imbens standard error to evaluate the TAACCCT effects on the three major outcomes.

Results

Propensity Score

We first conducted a logistic regression using the covariates specified above to predict the treatment status to see if the covariates (that are associated with the outcome) predict the treatment assignment. This is a way to test whether being in the TAACCCT group is explained by these variables. Variables (especially when they are associated with the academic outcomes of interest) significantly associated with the treatment assignment should be included in the propensity score matching.

Then we used propensity score matching to balance the pretreatment conditions between the treated and the controls. We assessed the extent to which propensity score matching reduced the difference between the treated and the control groups on the covariates by examining the standardized differences between the treated and the controls in terms of the covariates. Since we have six outcome variables and the sample used in each model differs (as shown in Appendix Table D-2), we present the balancing results respectively. The results on matching balance are presented in Appendix Tables D-4 through D-9. The first three examine the balance results on the three one-year academic outcomes: graduation within one year, immediate retention rate, and total credits earned in one year. The latter three tables present the balance results for two-year outcomes on graduation, retention, and total credits earned in a two-year period.

In general, logistic regression results suggest that students who are female or are eligible to receive Pell grants are less likely to be in the treatment group. However, taking replacement courses is positively associated with receiving TAACCCT. These three variables are significantly

associated with treatment assignment (see appendix tables on balance check. The significance level is $p = 0.05$). Propensity score matching helps reduce the difference in the TAACCCT and non-TAACCCT samples on these covariates. The reduction in difference toward zero after matching suggests better balance or less difference in the pre-treatment conditions between the treated and the controls. After propensity score matching, the difference between the treated and the controls are not significant.

Treatment effects

Table 10 presents the differences in the one-year outcomes estimated after propensity score matching. Table 11 shows the difference in the two-year outcomes estimated upon propensity score matching. The estimated effects are treatment effects on the treated. When significant findings were discovered, treatment effects were evaluated using robust standard errors to examine the treatment effects in the population. In general, TAACCCT students out-performed the non-TAACCCT IT students in terms of completion rate and total number of credits earned within one year. Though similar findings were discovered in the two-year outcomes, the differences between the treated and the controls were not statistically significant. Finally, TAACCCT students' retention rate was almost the same as their counterpart non-TAACCCT students. The difference was very small and not significant.

<u>One-Year Outcomes</u>

As demonstrated in Table 10, graduation rates among the first-time TAACCCT students were higher than the IT students (6% vs 1%). The 1-year graduation rate among the TAACCCT students was significantly higher than that of IT students. The positive impact remains when we consider treatment effects in the population using robust standard error. TAACCCT students on average earned over two credits more than their non-TAACCCT counterparts. The difference in the total number of credits earned within one year is statistically significant when we consider the treatment effects on the treated. The impact remains significant when we consider the treatment effect in the general population using the robust standard error estimator.

The results suggest the TAACCCT program had an immediate impact on the students served, leading to increased cumulative credits and completion rates.

TABLE 10. TREATMENT EFFECTS ON ACADEMIC OUTCOMES WITHIN ONE YEAR

Academic outcomes within one year	Treatment Group Mean/Proportion	Control Group Mean/Proportion	Mean/Proportion Difference
Completion rate within 1 year	0.06	0.01	0.05**
Immediate retention rate	0.53	0.54	0
Total credits earned within 1 year	12.43	10.16	2.28*

*p<.05 **p<.01 ***p<.001

Two-Year Outcomes

Table 11 examines the TAACCCT program impact over a two-year period. Although the program completion rate among the TAACCCT students was 18 percent, which was 9[10] percentage points higher than their counterpart non-TAACCCT students, the difference was not statistically significant. Similarly, although they earned over 1.7 credits more than the controls, that difference was not statistically significant, either. There was not much difference in retention between the treated and the controls. Therefore, the long-term impact of TAACCCT in boosting student's academic achievement is not evident, based on the current study. Failure to find statistically significant impact may be due to the small sample size (only 156 TAACCCT students with two-year outcomes), which may result in less statistical power to detect any significant difference.

TABLE 11. TREATMENT EFFECTS ON ACADEMIC OUTCOMES WITHIN TWO YEARS

Academic outcomes within two years	Treatment Group Mean/Proportion	Control Group Mean/Proportion	Mean/Proportion Difference
Graduation rate within 2 year	0.18	0.09	0.09
Proportion retained for 2 terms if not graduated	0.28	0.29	-0.01
Total credits earned within 2 years	17	15.29	1.71

*p<.05 **p<.01 ***p<.001

In sum, the TAACCCT program has a positive impact on student's graduation and accumulation of credits. The impact is significant in the short term. The long-term influence is not evident at this point. This may be due to limitations in the dataset, which are discussed below.

Limitations

There are a few limitations to note regarding the findings. First, the study sample size of around 200 students per academic year is small. Second, the duration of the observation period is at most two years, the time spent observing engineering students. This is particularly problematic when we examine distal outcomes such as students' graduation or retention rates. Third, the data used in this study are Clark State administrative data, which record students' academic information and demographic characteristics. However, administrative data do not provide information on students' family and social background – factors that may be associated with their academic achievements and outcomes. Future studies are needed to understand the mechanisms through which TAACCCT has a positive effect on graduation and credit accumulation.

[10] The sample different was only marginally statistically significant ($t = 1.74$, $p < 0.1$).

DISCUSSION: LONG-TERM OUTCOMES AND IMPACTS OF THE AMCGE PROGRAM

As noted in the Methods section, the intended outcomes of any given logic model include three categories: outputs (direct and immediate results of the program activities), outcomes (short- and long-term changes in participants), and impacts (broader changes in the organization or communities). At the program's conclusion, we can measure the outputs and short-term outcomes of the program, as we have done in the Key Implementation Activities section of this report and the Interim Reports before it. However, long-term outcomes typically take four to six years to produce, and the broader impacts are typically expected in seven to ten years – both well after the conclusion of the project. While we cannot predict the future, we can at the conclusion of the project identify areas that may need more attention moving forward. We can also examine some shoots that may ultimately blossom into the long-term outcomes and impacts that the Clark State team is hoping to achieve.

While acknowledging that these are by no means mutually exclusive categories, for clarity we have organized these observations into three broad categories: student-, college-, and community-related outcomes and impacts. We also discuss our observations on other factors that may affect the sustainability of the project moving forward.

Student Outcomes and Impacts

Student outcomes and impacts are the longest category of outcomes and impacts, as improved experiences and trajectories for students were always the central mission of the AMCGE grant. The logic model includes student outcomes that are quantitatively measurable: improvements in completion/retention, credential-earning, and credit-earning, and securing and retaining employment. These alone are difficult targets to reach in three years, given the realities of academic calendaring and the sheer amount of time it takes to earn

Target Outcomes & Impacts

Students

- Participants complete program of study or are retained.
- Participants complete credentials or earn credits.
- Graduates find and are retained in employment.
- Graduates experience wage increases.
- Students have a clear pathway to future education.
- Participants continue along career pathways and enroll in future education.

College

- Create "purposeful synergy" to enhance learning experience for students
- Increased presence of local manufacturing employers on campus
- Students develop relationships with local employers
- Model for scaling I-BEST, PLA, and wrap-around services in other CSCC programs
- Increased profile for advanced manufacturing programs and CSCC in local area
- Long-term relationships with local business community established and maintained, increasing opportunities for students, and for employers to fill workforce needs

Community

- Contributing to community and economy by attracting growth for manufacturing industry in the area; lower unemployment and less need for public assistance

credentials. However, Clark State has created a short-term stackable certificate, the Manufacturing Foundations certificate, which can be accomplished in nine credits and includes introductory and foundational skills, a 1-credit employability skills seminar, and a 10-hour OSHA general safety course. This certificate ensures that all Clark State MET graduates operate from a shared knowledge and base of skills and creates predictability about a core set of skills that all graduates will possess, which is useful for local employers. It is offered in the first semester of a typical path through the programs and gives students a 'quick win' while placing them on the path toward further specialized certifications, and also gives them 9 of the 61 credits required for an MET Applied Associate degree. The certificate is embedded within the specialty certificates, which range from 21 to 24 credits, meaning that completion of the Manufacturing Foundations certificate puts a student more than a third of the way toward these more advanced certificates. In addition, though it does not include the general education courses that will be required for the MET AAS, the two foundational courses included in the Manufacturing Foundations certificate – ENT 1000, Introduction to Industrial and Engineering Technology, and ENT 1050, Manufacturing Foundations, are taught using the I-BEST model. This means that students who may need developmental education are immediately receiving math and English instruction in an applied manner that may be more approachable and less stigmatized than a regular developmental education course. This is a strong strategy for encouraging students who may not see themselves as college material to dream bigger. Our outcomes analysis, though necessarily limited in its timeframe, indicates some positive impact of the program for short-term educational outcomes.

The career navigator position was also beneficial for this purpose. The navigators were able to communicate the potential value of these certificates and pathways to students, clarifying questions and pushing students to stay engaged along the way. Having a shepherd to help students who may be unfamiliar with college processes was useful not only to students but also to the faculty who relied on the navigator to follow up with students and help ensure no one fell through the cracks. Losing this position may prove to be a difficult hurdle to overcome, as general advising begins a more holistic approach but also does not yet have the headcount to keep their advising caseloads low. There will likely not be enough hours in the day to pursue students who are struggling with the same level of vim and vigor that a navigator with a low caseload could. Faculty will likely need to play a bigger role in catching lost students and in articulating the logistics of the pathway and its potential for students.

It remains to be seen how the navigator gap affects the program. It may be that the navigator was only needed to get the program up and running, and other positions can take it from here, particularly in the broader context of the college's guided pathways reforms. However, the future for wraparound services at Clark State has some promise. The shared navigator position has strengthened a relationship to Clark County Department of Jobs and Family Services (DJFS) that will continue beyond the navigator position itself, as DJFS begins to have a greater physical presence on campus and general advising becomes more familiar with the provision of wraparound services.

Now, with the addition of the MET applied bachelor's degree, students who complete these foundation certificates have not only made progress toward further certificates and associate degrees but toward a four-year degree. With this in-house option for continuing education, students will have less credit loss than they may face in an external transfer to a four-year school, geographic accessibility is enhanced, and the per-credit-hour cost will remain low. These factors all add up to a much more accessible pathway for nontraditional students, who comprise the majority of Clark State's MET population.

Obviously, without a program in place yet, we cannot determine whether these students will persevere along the pathways and continue their education. But we can comment that the design addresses a lot of the barriers to college completion for nontraditional students: confidence is bolstered through quick wins and approachable English and math lessons; students are not lost in a developmental education limbo before they can begin credit-bearing coursework; pathways are clearly laid out, and credit-transfer loss is mitigated; wraparound services help students address personal issues that can be detrimental to further education; and costs are controlled. The main threat that the program will face is ensuring that services offered by the navigator role are fully covered, so that students continue to receive complete information and encouragement to continue along these paths.

College Outcomes and Impacts

In addition to the aforementioned student outcomes and impacts, Clark State set organizational goals for itself with the grant. Among these goals was the creation of 'purposeful synergy' to enhance the learning experience for students in the MET programs. The grant provided the college with the opportunity to develop various strategies and programs within the context of the MET programs that could later be expanded to other areas of the college. The college sought to build a model for scaling PLA, I-BEST, a career navigator model of advising, and employer engagement in other CSCC programs.

In the AMCGE program, multiple units of the school joined with faculty to have regular meetings, discussing progress and working through decisions. The resources of a variety of positions were brought to bear on the objectives of the program. Perhaps the greatest success in purposeful synergy was found in the PLA process, where reform was accomplished not only for MET programs but for the entirety of Clark State; the new model is cleaner and more consistent than previous arrangements, more closely aligned to curriculum objectives, and easier to navigate for students. The broader impact on the college was easily observable. However, the process that underlay this reform involved bringing stakeholders from across the college into the fold. The initial product was created by a large working group and was reworked as it went through the faculty approval process; the involvement of so many stakeholders slowed the process considerably. Though the overall effort took a great deal longer than initially anticipated, the process was a collective effort and completely transparent. Lessons from this effort can be applied in the future, and the effort allowed different units in the school an opportunity to better understand the positions and goals of other units.

The MET program served as a test case for I-BEST, and despite some initial growing pains, faculty and staff considered the model to be a great success. This model will be sustained in the MET program, carried forward into the MET applied baccalaureate, and is being considered for expansion into other technical programs in the school. As it expands, the school will need to consider its benefit versus its costs. With two instructors and the extra planning time that teaching I-BEST courses entails, it is an inherently expensive model. While I-BEST does not prevent all students from needing further developmental education, it does allow students to immediately dive into credit-bearing college-level coursework, giving students who are nervous about college a less intimidating exposure to core concepts before they move into more specific core courses like English and math (or further developmental coursework, for those who need more extensive remediation). It also provides an extra set of hands in classes during the first semester, affording students greater attention from Clark State faculty at the point of entry. The benefit-to-cost ratio may differ by program, and its utility may be limited to technical degrees. However, propagation of the model to other departments at Clark State is worth exploring.

Though the navigator is gone, the wraparound services initiated through the role will continue through general advising as the college moves to a success coach model. Advisors will be more aware of external programs and funding sources available to help students who are struggling and will be better able to identify these needs in students and to match them to the appropriate resource. This is a shift that will benefit all students of Clark State, and it stands as a strong legacy of the TAACCCT program. Further, the advising model moving forward will become based in specific fields, with advisors assigned to specialize in particular subject areas.

Finally, Clark State set the goal of building and strengthening its connections to local employers. Specifically, it sought to increase local employers' presence on campus and to help students develop relationships with those employers. This would help the college establish and maintain long-term relationships with the local business community, increasing opportunities for its students and for local employers to fill workforce needs. Staff from across the college worked to foster and build these relationships with their employer partners through a variety of engagement strategies.

Employers' presence on campus has increased. One major draw for this is the new lab space; the school regularly brings in employers to tour that facility, and it draws positive reviews from those who visit. They are also brought in for regular EET meetings. Students are meeting employers as they attend classes and are developing relationships with employers through the co-op requirement. Employers benefit by meeting students early, becoming familiar with the skills and talents of Clark State graduates.

The greatest evidence for success in this area is the successful effort to establish the applied baccalaureate in MET. This was a collaborative effort with employers, over 20 of whom demonstrated their encouragement by writing letters of support and/or offering official

testimony to the state. The willingness of employers to dedicate the time to this endeavor is a vote of confidence in not only the proposed program but in the school itself, and it is evidence of a strong relationship between the school and local employers.

Clark State has followed both formal and informal processes for engaging with employers. The only weakness that appears on the horizon is the lack of central tracking for employer contacts. While this is functionally appropriate, as the program is small and the school itself is small, future growth may make this system (or lack thereof) more of a problem. However, the robustness of the engagement with employers in the MET programs is a model for engagement across the college's other programs.

Community Impacts

In addition to the aforementioned impact on local employers, Clark State set out to accomplish several objectives that would impact the broader economy of the local area. It sought to increase the profile of advanced manufacturing programs and the college in the local area and to contribute to the community and economy by attracting growth for the local manufacturing industry, lowering unemployment and the need for public assistance. Though these are broader impacts than the school would be able to fully achieve within three years, a few promising developments emerged. With its greater attention to recruitment and building connections to schools, along with its stronger connection to local employers and local workforce partners, the school is enjoying an increased profile in the community. Clark State's collaboration with the local Chamber of Commerce is helping to attract industry to the area according to both Clark State representatives and a representative of the Chamber.

It is still too early to know whether all of these efforts have led to greater opportunities for students; we only have preliminary data, and many of these new relationships have not yet had the time to fully bloom. However, there are many reasons to be optimistic that Clark State is witnessing only the beginnings of what it will accomplish with local employers – including the new employers it has helped attract to the area – and the positive impact it will have on the community.

Other Considerations for Sustainability

Funding is a central concern at the conclusion of any grant. Clark State is actively pursuing other grant-funded opportunities, as is appropriate. However, it is also addressing changes in funding in more sustainable ways, such as by adjusting staffing to meet changing needs and seeking support from local employers. While the discontinuation of the career navigator will change the nature of services offered, if the school can successfully integrate the duties elsewhere, this is one cost savings. Local employers have proven themselves willing to support the program financially through the addition of the robotics lab, which came in part through donations. If the school is able to continue to build and capitalize on these

relationships, they may be a critical source of support in the future, particularly for the maintenance of the lab and equipment.

Concrete student outcomes are also a concern. It is too early to discern the broader impact of the program on students' socioeconomic statuses. Given its expense, the program will need to demonstrate strong growth in these areas in the next few years to maintain momentum.

Finally, throughout the grant, we had multiple opportunities to observe the faculty and staff of Clark State at work. We interviewed them, surveyed them, attended their meetings, read their notes, and even traveled with them. The collaborative spirit of Clark State was observable in most of our interviews and observations, and the high levels of formal and informal communications enhanced its efficacy. This culture, which likely existed before the grant but was expand upon and enhance by it, will serve Clark State well as it moves forward with future related initiatives and is an asset for the overall sustainability of the grant.

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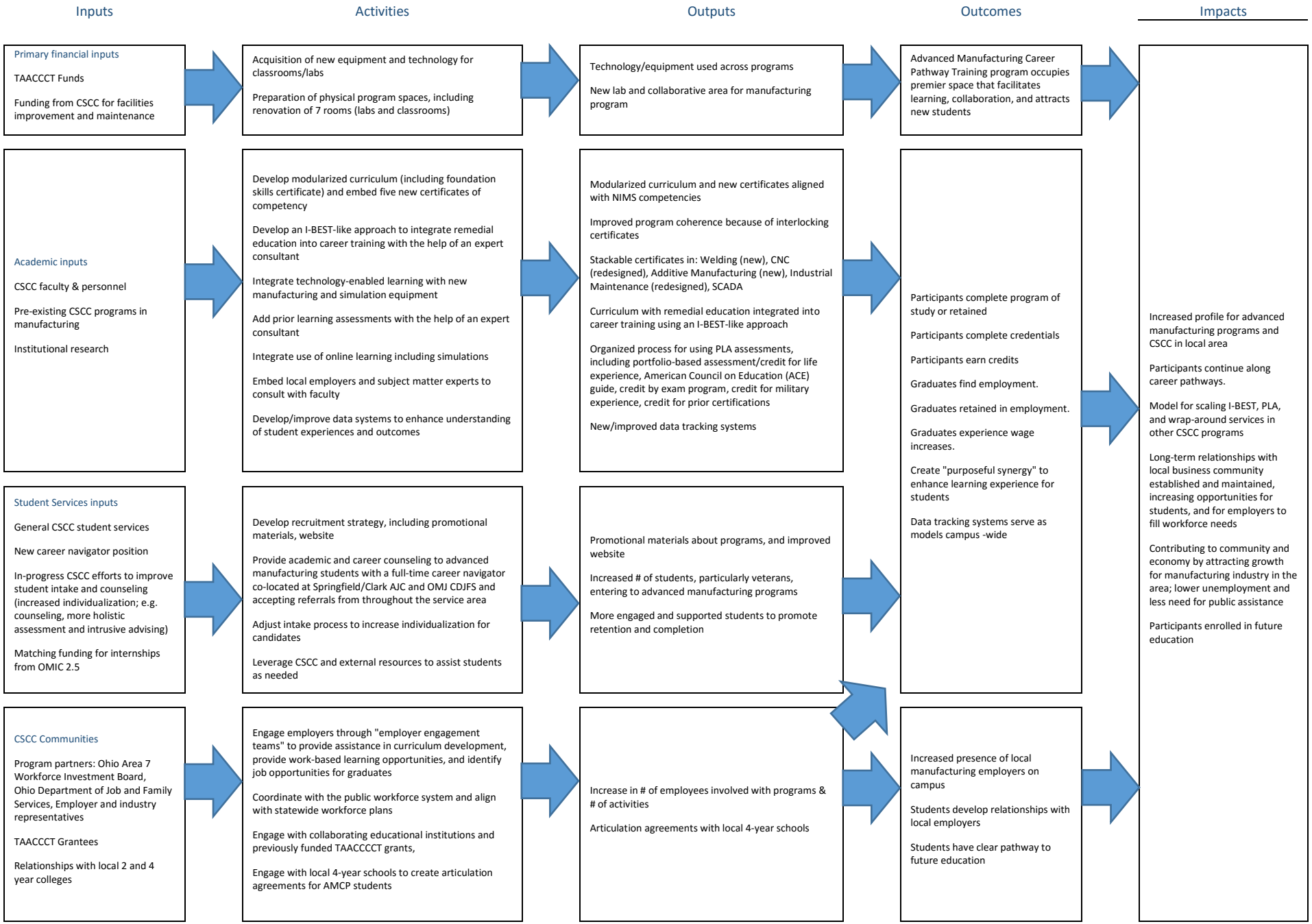
APPENDIX A. CLARK STATE TAACCCT EVALUATION LOGIC MODEL: ADVANCED MANUFACTURING CAREER PATHWAY TRAINING



APPENDIX B. CLARK STATE ADVANCED MANUFACTURING PROGRAM PATHWAYS

Assessing program pathways: How smooth is the transition from certificate student to degree student?

The Clark State AMP TAACCCT program touches five certificate programs: Additive Manufacturing (new), Computer Numerical Control (CNC – redesigned), Industrial Maintenance (redesigned), Supervisory Control and Data Acquisition (SCADA – new), and Welding (new). All certificate programs can be applied to one of two associate of applied science degrees (hence the "stackability"): Manufacturing Engineering Technology (MET) and Industrial Technology. All MET AAS students are required to complete two departmental certificates (in addition to the five TAACCCT-touched certificates, there is one other option: Computer Aided Design), meaning that all MET AAS students will benefit from TAACCCT-touched courses. The MET AAS and its related certificate programs are offered at Clark State's Springfield campus only. If students satisfy all prerequisites and college preparatory minimums, the AAS can be completed in two years (including a 2-credit summer co-op between Year 1 and Year 2). For the certificate programs, if students satisfy all prerequisites and college preparatory minimums, the certificates can be completed within one year. (All are comprised of 24 credits except the Welding Departmental Certificate, which is comprised of 21 credits.)

TABLE B-1. CERTIFICATES EMBEDDED IN MET AAS DEGREES AT CLARK STATE COMMUNITY COLLEGE

Industrial Technology AAS (60 credits)	Mechanical Engineering Technology (63 credits)
Manufacturing Foundations Departmental Certificate (9 credits)[1]	Manufacturing Foundations Departmental Certificate (9 credits) [1]
Industrial Maintenance Departmental Certificate (24 credits)	Additive Manufacturing Short-Term Technical Certificate (24 credits)[3]
Supervisory Control and Data Acquisition (SCADA) Departmental Certificate (21 credits)[2]	Computer Numerical Control (CNC) Departmental Certificate (24 credits)[4]
Welding Short-Term Departmental Certificate (21 credits)[5]	Welding Short-Term Departmental Certificate (21 credits)[5]

[1]Certificate fully embeds in all MET degrees and departmental certificates listed in table.

[2]Certificate requires one course, INT 2520 Supervisory Control and Data Acquisition, which is not part of the AAS. Certificate also aligns with the Industrial Maintenance Departmental Certificate, with two extra courses: INT 2510 Process Control, and INT 2520.

[3]Certificate requires two courses, ENT 1410 Introduction to Additive Manufacturing, and ENT 1420 Rapid Prototyping Model Design and Fabrication, which are not part of the AAS.

[4]Certificate requires three courses, ENT 1310 Computer Numerical Control (CNC) Machine Operator – Turning, ENT 1320 Computer Numerical Control (CNC) Machine Operator – Milling, and ENT 1330 Fundamentals of Computer Numerical Control (CNC), which are not part of the AAS.

[5]Certificate fits equally well into both AAS options and has four additional courses which are not part of either AAS: WLD 1000 Introduction to Welding Processes, WLD 1010 Gas Metal Arc Welding (GMAW), WLD 1020 Shielded Metal Arc Welding (SMAW), and WLD 1030 Gas Tungsten Arc Welding (GTAW).

The Additive Manufacturing, CNC, and Welding programs embed most cleanly with the MET AAS degree. For students in the Industrial Maintenance and SCADA programs, the Industrial Technology AAS is a much cleaner integration. The SCADA certificate program was designed as an add-on certificate in Industrial Maintenance; it shares all but two courses with the IM certificate, swapping in INT 2510 Process Control and INT 2520 Supervisory Control and Data Acquisition (SCADA) for INT 1350 Motor and Motor Controls and INT 1400 Mechanical Maintenance. This means that students who are already in the Industrial Maintenance certificate program can add the SCADA certificate by taking two extra classes; for those in the Industrial Maintenance AAS program, only one extra course (INT 2520) would be required.

Based on information appearing in the Summer 2018 catalog, students who begin on a certificate-only path but then move to the AAS path with a desire to "catch up" before Year 2 can do so fairly easily; all of the English and Math courses not included in the certificate programs appear to be offered in multiple sections over the summer session.

In the following pages, we outline the requirements for each program.

PART I. REQUIREMENTS FOR TAACCCT CERTIFICATE-ONLY PROGRAMS

Additive Manufacturing Departmental Certificate (new)

Abbreviated catalog description: *The Additive Manufacturing Certificate is designed for students who wish to enhance their skills in areas related to 3D printing and scanning. Students can apply the program courses to the Manufacturing Engineering Technology Associate Degree.*

TABLE B-2. RECOMMENDED PROGRAM FOR CLARK STATE ADDITIVE MANUFACTURING DEPARTMENTAL CERTIFICATE

Course	Title	Credits
Fall		
CAD 2100	Solid Modeling	3
ENT 1000	Introduction to Industrial and Engineering Technology	3
ENT 1050	Manufacturing Foundations	4
INT 1000	OSHA 10-Hour General Safety	1
EBE 1000	Employability Skills	1
Spring		
ENT 1410	Introduction to Additive Manufacturing	3
ENT 1420	Rapid Prototyping Model Design and Fabrication	3
ENT 1500	Engineering Materials	3
ENT 2100	Manufacturing Processes	3
	Total Credit Hours	24

All 24 certificate credits can be directly applied to the MET AAS.
Upon completion of this certificate, the remaining steps to the MET AAS are:
Completion of 39 remaining credits, including a second certificate program (Additive Manufacturing certificate-only students will have completed about 38 percent of the MET AAS program).

Computer Numerical Control Departmental Certificate (CNC – redesigned)

Abbreviated catalog description: *The Computer Numerical Control (CNC) Certificate is designed for students who wish to enhance their skills in areas related to CNC Machine Operation and CNC*

programming. Students can apply the program courses to the Manufacturing Engineering Technology Associate Degree.

TABLE B-3. RECOMMENDED PROGRAM FOR CLARK STATE CNC DEPARTMENTAL CERTIFICATE

Course	Title	Credits
Fall		
ENT 1000	Introduction to Industrial and Engineering Technology	3
ENT 1050	Manufacturing Foundations	4
ENT 1310	Computer Numerical Control (CNC) Machine Operator – Turning	3
INT 1000	OSHA 10-Hour General Safety	1
EBE 1000	Employability Skills	1
Spring		
ENT 1320	Computer Numerical Control (CNC) Machine Operator – Milling	3
ENT 1330	Fundamentals of Computer Numerical Control (CNC)	3
ENT 1500	Engineering Materials	3
ENT 2100	Manufacturing Processes	3
	Total Credit Hours	24

Progress toward MET AAS:

All 24 certificate credits can be directly applied to the MET AAS.
Upon completion of this certificate, the remaining steps to the MET AAS are:

Completion of 39 remaining credits, including a second certificate program (CNC certificate-only students will have completed about 38 percent of the MET AAS program).

Industrial Maintenance Departmental Certificate (redesigned)
Abbreviated catalog description: *The Industrial Maintenance Certificate provides a broad base of courses in the field of industrial maintenance. The program courses are all included in the Industrial Technology Associate Degree. The program courses may also be applied toward the Manufacturing Engineering Associate Degree.*

TABLE B-4. RECOMMENDED PROGRAM FOR CLARK STATE INDUSTRIAL MAINTENANCE DEPARTMENTAL CERTIFICATE

Course	Title	Credits
Fall		
INT 1000	OSHA 10-Hour General Safety	1
INT 1300	Electrical Systems	3
ENT 1000	Introduction to Industrial and Engineering Technology	3
ENT 1050	Manufacturing Foundations	4
EBE 1000	Employability Skills	1
Spring		
INT 1201	Hydraulics and Pneumatics I	3
INT 1350	Motor and Motor Controls	3
INT 1400	Mechanical Maintenance	3
INT 2500	Programmable Logic Control	3
	Total Credit Hours	24

Upon completion of this certificate, the remaining steps to the MET AAS are:

- Completion of 45 remaining credits, including a second certificate program (Industrial Maintenance certificate-only students will have completed nearly 28 percent of the MET AAS program – the Manufacturing Foundations certificate, which is embedded in both the certificate and the AAS, and nine of the certificate-related elective courses).
- Some credits do not apply toward course requirements for the MET AAS, as the AAS program includes three specialized courses per certificate; Industrial Maintenance has five courses, so two courses' worth of credit (6 credits) would not be counted in the 63 required credits. However, all courses can be applied to the Industrial Technology Associate Degree.

Upon completion of this certificate, the remaining steps to the Industrial Technology AAS are:

- Completion of 36 remaining credits (Industrial Maintenance certificate-only students will have completed 40 percent of the MET AAS program).

Supervisory Control and Data Acquisition (SCADA) Departmental Certificate (new)
Abbreviated catalog description:
Learning Outcomes: Monitor and control process applications using sensors networked to equipment

TABLE B-5. RECOMMENDED PROGRAM FOR CLARK STATE SCADA DEPARTMENTAL CERTIFICATE

COURSE	TITLE	CREDITS
Fall		
ENT 1000	Introduction to Industrial and Engineering Technology	3
ENT 1050	Manufacturing Foundations	4
INT 1300	Electrical Systems	3
INT 2500	Programmable Logic Control	3
Spring		
INT 1000	OSHA 10-Hour General Safety	1
INT 2510	Process Control	3
INT 2520	Supervisory Control and Data Acquisition (SCADA)	3
EBE 1000	Employability Skills	1
	Total Credit Hours	21

Considered by the program to be an add-on to the Industrial Maintenance certificate; overlaps for all but two classes (the SCADA certificate replaces INT 1201, INT 1350, and INT 1400 in the Industrial Maintenance certificate with INT 2510 and INT 2520).

Upon completion of this certificate, the remaining steps to the MET AAS are:

- Completion of 45 remaining credits, including a second certificate program (Industrial Maintenance certificate-only students will have completed nearly 28 percent of the MET AAS program – the Manufacturing Foundations certificate, which is embedded in both the certificate and the AAS, and nine of the certificate-related elective courses).

- Some certificate credits may not apply toward requirements for the MET AAS, as the AAS program includes three specialized courses per embedded certificate; Industrial

Maintenance has five specialized courses, so two courses' worth of credit (6 credits) may not be counted in the 63 required credits. However, all courses can be applied to the Industrial Technology Associate Degree.

Upon completion of this certificate, the remaining steps to the Industrial Technology AAS are:

- Completion of 39 remaining credits (Industrial Maintenance certificate-only students will have completed 40 percent of the MET AAS program).

Welding Departmental Certificate (New)

Abbreviated catalog description: *The Welding Certificate is designed for students who wish to enhance their skills in areas related to SMAW, GMAW, GTAW, oxyacetylene, and plasma cutting. Students can apply the program courses to the Manufacturing Engineering Technology Associate Degree.*

TABLE B-6. RECOMMENDED PROGRAM FOR CLARK STATE WELDING DEPARTMENTAL CERTIFICATE

COURSE	TITLE	CREDITS
Fall		
WLD 1000	Introduction to Welding Processes	3
ENT 1000	Introduction to Industrial and Engineering Technology	3
ENT 1050	Manufacturing Foundations	4
INT 1000	OSHA 10-Hour General Safety	1
EBE 1000	Employability Skills	1
Spring		
WLD 1010	Gas Metal Arc Welding (GMAW)	3
WLD 1020	Shielded Metal Arc Welding (SMAW)	3
WLD 1030	Gas Tungsten Arc Welding (GTAW)	3
	Total Credit Hours	21

Upon completion of this certificate, the remaining steps to the MET AAS are:

- Completion of 43 remaining credits, including a second certificate program (Welding certificate-only students will have completed about 28 percent of the MET AAS program).
- 18 of the 21 certificate credits directly apply to the MET AAS, as the AAS program requirements include three specialized classes per embedded certificate and Welding includes four specialized certificate courses.

PART II. REQUIREMENTS FOR ASSOCIATE DEGREES THAT INTEGRATE TAACCCT CERTIFICATE PROGRAMS

Manufacturing Engineering Technology Associate of Applied Science Degree

Abbreviated catalog description: *The Manufacturing Engineering Technology program prepares students for a variety of positions within a manufacturing enterprise. The program builds on the student's knowledge of computer-aided design, electronics, and manufacturing processes, providing additional skills in areas such as statistical process control, automation, and computer numerical control.*

Students will choose two certificate programs in the following areas: Computer Numerical Control (CNC), Manufacturing, Additive Manufacturing, Welding, SCADA, Computer-Aided Design (CAD) or Industrial Maintenance. In addition to the courses in these programs, students will complete coursework to fulfill requirements for the Manufacturing Engineering Associate Degree. In addition to applied technical courses, the Manufacturing Engineering Technology Associate Degree includes a co-op experience. Students must complete EBE 1000, Employability Skills, as a technical elective and then work with the Office of Career Management to secure an appropriate co-op site.

The program schedule that follows is designed for full-time students who have completed all prerequisites and who have no college preparatory recommendations. Many individuals, especially part-time students and those taking college preparatory courses, will require additional semesters of study. Students should consult their academic advisors for help in planning their schedules.

Scholastic Preparation

Students starting the program should have had one year each of high school algebra, trigonometry, and physics or the equivalents. Students may take these preparatory courses at Clark State, but they will require a longer amount of time to complete their degree program. Those without high school physics must complete PHY 1100, Fundamentals of Physics.

Learning Outcomes

Upon completion of an Associate of Applied Science degree in Manufacturing Technology, a graduate will be able to:

- Design, produce, and document a finished product per quality specifications using knowledge of engineering, materials, metrology, and manufacturing processes.
- Use computers in troubleshooting, maintenance planning, and report writing.
- Demonstrate basic knowledge of manufacturing processes, including safety, cost, documentation, material selection, fabrication, and assembly.
- Formulate and analyze the mathematical models for physical and engineering problems.
- Use commonly available instruments, schematics, operating manuals, and troubleshooting guides.

TABLE B-7. RECOMMENDED PROGRAM FOR CLARK STATE MANUFACTURING ENGINEERING TECHNOLOGY ASSOCIATE DEGREE

Course	Title	Credits
Fall		
ENT 1000	Introduction to Industrial and Engineering Technology	3
ENT 1050	Manufacturing Foundations	4
EBE 1000	Employability Skills	1
ENG 1111	English I	3
INT 1000	OSHA 10-Hour General Safety	1
MTH 1280	College Algebra	OR
MTH 2200	Calculus I	4
Spring		
ENT 1450	Direct Current (DC) Circuits	3
ENT 1500	Engineering Materials	3
ENG 1112	English II	3
MTH 1340	Pre-Calculus	OR
MTH 2220	Calculus II	5
Summer		
EBE 2702	Co-op Education I	2
Fall		
ENT 1460	Alternating Currents (AC) Circuits	3
ENT 2200	Statics	3
CAD 2100	Solid Modeling	3
PHY 1501	General Physics I with Algebra	OR
PHY 2501	College Physics I with Calculus	5
--	Arts/Humanities or Social/Behavioral Science (GA) Elective	3

Spring		
ENT 2100	Manufacturing Processes	3
ENT 2300	Strength of Materials	3
ENT 2600	Engineering Design	3
PHY 1502	General Physics II with Algebra	OR
PHY 2502	College Physics II with Calculus	5
	Total Credit Hours	63

Industrial Technology Associate of Applied Science Degree
Abbreviated catalog description: *The Industrial Technology program has been developed in response to the great need for skilled technicians expressed by manufacturers in the Champaign, Clark, Greene, and Logan County areas. The program is intended to train for career fields such as machine repair technician, electrical maintenance technician, or industrial maintenance mechanic.*

Technical coursework in the program is designed such that it can be used to support company-sponsored apprenticeship programs.

Some required courses for the associate degree are offered only at the Springfield location. In addition to applied technical courses, Industrial Technology includes a co-op experience. Students must complete EBE 1000, Employability Skills, and then work with career services to secure an appropriate co-op site.

Learning Outcomes
Upon completion of an associate degree in Industrial Technology, a graduate will be able to:

- Design, produce, and document a finished product per quality specifications using knowledge of engineering, materials, metrology, and manufacturing processes.
- Use computers in troubleshooting, maintenance planning, and report writing.
- Demonstrate basic knowledge of manufacturing processes, including safety, cost, documentation, material selection, fabrication, and assembly.
- Formulate and analyze the mathematical models for physical and engineering problems.
- Use commonly available instruments, schematics, operating manuals, and troubleshooting guides.
- Demonstrate and understand the safety requirements for working in an industrial setting.
- Demonstrate fundamental knowledge of power machinery.

Directed Learning Laboratory
Clark State Community College has recognized the need for students who are currently working to have flexible class hours. As a result, many of the courses in the Industrial Technology program will be offered in the College's Directed Learning Laboratory. Most Industrial Technology (INT) courses, along with other selected technical courses, will be offered in a modular format that will allow students to come to the lab on their own schedule and complete the coursework and laboratory assignments. The lab will be staffed by a faculty member and is open day, evening, and Saturday hours to accommodate many working schedules. The days and times that students complete the coursework in the lab is up to the individual student within the open hours of the lab. Some group assignments may be required. The ability to learn on an independent basis will help ensure student success in this program.

Scholastic Preparation
Students should have had one year of high school algebra or the equivalent. Students may take

preparatory courses at Clark State, but doing so will add to the amount of time it takes to complete their degree program.

TABLE B-8. RECOMMENDED PROGRAM FOR CLARK STATE INDUSTRIAL TECHNOLOGY ASSOCIATE DEGREE

COURSE	TITLE	CREDITS
Fall		
INT 1000	OSHA 10-Hour General Safety	1
INT 1300	Electrical Systems	3
EBE 1000	Employability Skills	1
ENG 1111	English I	3
ENT 1000	Introduction to Industrial and Engineering Technology	3
ENT 1050	Manufacturing Foundations	4
Spring		
INT 1201	Hydraulics and Pneumatics I	3
INT 1350	Motor and Motor Controls	3
INT 1400	Mechanical Maintenance	3
INT 2500	Programmable Logic Control	3
MTH 1115	Industrial Calculations	3
Summer		
EBE 2702	Co-op Education I	2
Fall		
INT 2200	Hydraulic and Pneumatic Troubleshooting	3
INT 2300	Electrical Troubleshooting	3
INT 2325	Alternating Current/ Direct Current (AC/DC) Servos	3
INT 2400	Industrial Machine Maintenance	3
--	Arts/Humanities or Social/Behavorial Science (GA) Elective	3
Spring		

INT 2510	Process Control	3
ECO 2210	Principles of Macroeconomics	OR
ECO 2220	Principles of Microeconomics	3
ENG 2211	Business Communication	3
PHY 1100	Fundamentals of Physics	4
	Total Credit Hours	60

APPENDIX C. OVERVIEW OF PROGRAMS USED AS COMPARISON IN PROPENSITY MATCHING ANALYSIS

In collaboration with the implementation and Institutional Research personnel at Clark State, the EERC selected Information Technology (IT) programs as the best comparison population for Clark State's MET programs. These programs share demographic features (for example, both skew heavily male), are both more in line with workforce training than traditional, transfer-oriented community college programs, and both have smaller certificates embedded into larger AAS degree paths. While the MET programs are part of the Agricultural, Engineering, and Mechanical Services division of the school, the IT programs are located in the Business Technology division.

The programs included in this comparison group were:

- Computer Software Development AAS and embedded certificate
- Computer Networking AAS
- Computer Networking – Technical Systems Support AAS
- Cybersecurity/Information Assurance Technology AAS

Students in Clark State IT programs have many opportunities to acquire short-term (less than 30 credit-hour) certificates in the field, which can be acquired with little to no coursework beyond that required for the AAS degree. The major exception to this is the Technical Support Short-Term Technical Certificate, which includes five extra courses. Among short-term certificates in Business Technology, six certificates closely align with the IT AAS degrees: Computer Programming, Cybersecurity, Network Administration, Network Infrastructure, Technical Support, and Web Development. Table C-1 outlines the alignment between certificates and AAS programs.

As in the MET programs, IT students who acquire an AAS will have automatically met the requirements for at least one certificate, and they can often achieve two (or up to three, in the case of Computer Networking) with little extra effort.

TABLE C-1. CERTIFICATES EMBEDDED IN INFORMATION TECHNOLOGY AAS DEGREES AT CLARK STATE COMMUNITY COLLEGE

Computer Software Development AAS (60 credits)	Computer Networking AAS (61 credits)	Computer Networking – Technical Systems Support AAS (61 credits)	Cybersecurity/ Information Assurance Technology AAS (61 credits)
Computer Programming Dept. Certificate (18 credits)	Network Administration Short-Term Technical Certificate (21 credits)	Network Administration Short-Term Technical Certificate (21 credits)	Cybersecurity Short-Term Technical Certificate (21 credits)
Web Development Departmental Certificate (27 hours)[1]	Technical Support Short-Term Technical Certificate (21 credits)[2]	Technical Support Short-Term Technical Certificate (21 credits)[2]	
	Network Infrastructure Short-Term Certificate (21 credits)		

[1]Certificate requires one course, CSD 2800 Advanced Topics, not on the required list for the AAS. However, the AAS does have room for one technical elective.

[2]Certificate requires an extra five courses not contained in either Computer Networking AAS program: ITS 1205 Windows Concepts, ITS 1215 Beginning Word Processing, ITS 1235 Beginning Spreadsheet, ITS 1236 Intermediate Spreadsheet, and ITS 1245 Beginning Database. The Computer Networking – Technical Systems AAS includes two ITS electives.

APPENDIX D. SUPPLEMENTAL TABLES FOR STUDENT OUTCOMES EVALUATION

TABLE D-1. CREDENTIALS EARNED BY TAACCCT STUDENTS, BY TYPE, FALL 2015 THROUGH FALL 2017

Certificates	Count
Additive Manufacturing	3
CNC	12
CAD	19
Industrial Maintenance	6
Manufacturing Foundations	52
Welding	14
Other	2
Total Certificates	108
AAS Degrees Earned	
Manufacturing Engineering Technology	4
Industrial Technology	5
Other	2
Total Degrees Earned	11
N	**119**

Source: Clark State Community College Student Administrative Data

TABLE D-2. DISTRIBUTION OF COVARIATES AMONG FIRST-TIME TREATED (TAACCCT-TOUCHED) AND CONTROLS (IT)

Trait	Treated		Control	
	N	%	N	%
Gender				
Female	31	10.2	108	19.7
Male	274	89.8	439	80.3
Race				
White	237	77.7	388	70.9
African-American	38	12.5	109	19.9
Other	19	6.2	32	5.9
Not Reported	11	3.6	18	3.3
Financial aid				
Pell Recipient	120	39.3	306	55.9
Military background				
Veteran	34	11.2	62	11.3
Registration status				
Full-time student	109	35.7	202	36.9
Part-time student	196	64.3	345	63.1
Replacement Status				
Taking replacement course	160	52.5	257	45.7
Age				
Nontraditional student (25 and older)	165	54.1	278	50.8
Traditional student (Less than 25)	140	45.9	269	49.2
Total number of new students	***305***		***547***	

TABLE D-3. ONE- AND TWO-YEAR OUTCOMES OF FIRST-TIME STUDENTS IN IT AND MANUFACTURING

Number of students in IT and Manufacturing used				
Academic Outcome	**IT new student between fall 2013 and fall 2017 (N = 547)**		**Manufacturing new student between fall 2015 to fall 2017 (N = 305)**	
	N	**cohorts included**	**N**	**cohorts included**
Graduation within 1 year	490	fall 2013 to spring 2017	247	fall 2015 to spring 2017
Graduation within 2 year	400	fall 2013 to summer 2016	156	fall 2015 to summer 2016
Total credits earned in 1 years	476	fall 2013 to spring 2017	247	fall 2015 to spring 2017
Total credits earned in 2 years	400	fall 2013 to summer 2016	156	fall 2015 to summer 2016
Immediate retention, if not graduated	465	fall 2013 to summer 2017	227	fall 2015 to summer 2017
Enrolled in more than 2 terms in two academic years	368	fall 2013 to spring 2016	128	fall 2015 to summer 2016

TABLE D-4. BALANCE CHECK FOR GRADUATION WITHIN 1 YEAR

Outcome: Graduate within 1 year	Logistic regression		Standardized Difference	
Covariates	Coefficient	Standard Error	Pre-match	Post-match
Age (ref: non-traditional)				
Traditional student	-0.32	0.17	-0.08	0.05
Full/part-time student (ref: part-time)				
Full-time	0.14	0.17	0.05	-0.02
Race (ref: White)				
Black/African American	-0.41	0.24	-0.22	-0.05
Other	-0.01	0.34	0.03	-0.10
Gender (ref: male)				
Female	-0.52*	0.25	-0.22	-0.08
Pell Status (ref: No)				
Pell Recipient	-0.77***	0.17	-0.36	0.06
Replacement status (ref: No)				
Replacement courses	0.48**	0.17	0.17	0.04
Veteran Status (ref: No)				
Veteran	-0.12	0.26	0.02	-0.09

*p<.05 **p<.01 ***p<.001

TABLE D-5. BALANCE CHECK FOR IMMEDIATE RETENTION

Outcome: Immediate Retention	Logistic regression		Standardized Difference	
Covariates	Coefficient	Standard Error	Pre-match	Post-match
Age (ref: non-traditional)				
Traditional student	-0.26	0.18	-0.07	0.02
Full/part-time student (ref: part-time)				
Full-time	-0.04	0.18	-0.03	0.02
Race (ref: White)				
Black/African American	-0.42	0.24	-0.23	-0.14
Other	0.07	0.34	0.05	-0.11
Gender (ref: male)				
Female	-0.49	0.25	-0.21	0.00
Pell Status (ref: No)				
Pell Recipient	-0.71***	0.18	-0.36	0.06
Replacement status (ref: No)				
Replacement courses	0.37*	0.17	0.11	0.05
Veteran Status (ref: No)				
Veteran	-0.08	0.27	0.02	-0.01

*p<.05 **p<.01 ***p<.001

TABLE D-6. BALANCE CHECK FOR TOTAL CREDITS EARNED WITHIN 1 YEAR

Outcome: Total credit earned within 1 year	Logistic regression		Standardized Difference	
Covariates	Coefficient	Standard Error	Pre-match	Post-match
Age (ref: non-traditional)				
Traditional student	-0.33	0.17	-0.09	0.10
Full/part-time student (ref: part-time)				
Full-time	0.21	0.17	0.08	0.00
Race (ref: White)				
Black/African American	-0.33	0.24	-0.20	-0.07
Other	-0.03	0.34	0.02	-0.05
Gender (ref: male)				
Female	-0.49**	0.25	-0.21	-0.04
Pell Status (ref: No)				
Pell Recipient	-0.80***	0.17	-0.38	0.02
Replacement status (ref: No)				
Replacement courses	0.45**	0.17	0.16	0.03
Veteran Status (ref: No)				
Veteran	-0.11	0.26	0.02	-0.13

*p<.05 **p<.01 ***p<.001

TABLE D-7: BALANCE CHECK FOR GRADUATION WITHIN 2 YEARS

Outcome: Graduate within 2 year	Logistic regression		Standardized Difference	
Covariates	Coefficient	Standard Error	Pre-match	Post-match
Age (ref: non-traditional)				
Traditional student	-0.22	0.21	-0.01	0.10
Full/part-time student (ref: part-time)				
Full-time	0.31	0.20	0.13	-0.04
Race (ref: White)				
Black/African American	-0.27	0.28	-0.18	-0.11
Other	0.00	0.39	0.03	-0.05
Gender (ref: male)				
Female	-0.58	0.30	-0.25	-0.03
Pell Status (ref: No)				
Pell Recipient	-0.80***	0.21	-0.38	0.01
Replacement status (ref: No)				
Replacement courses	0.26	0.20	0.06	0.03
Veteran Status (ref: No)				
Veteran	-0.13	0.32	0.01	-0.13

*p<.05 **p<.01 ***p<.001

TABLE D-8: BALANCE CHECK FOR RETENTION OF LONGER THAN TWO TERMS

Outcome: Retained > 2 terms	Logistic regression		Standardized Difference	
Covariates	Coefficient	Standard Error	Pre-match	Post-match
Age (ref: non-traditional)				
Traditional student	-0.13	0.23	0.04	0.07
Full/part-time student (ref: part-time)				
Full-time	0.22	0.23	0.09	0.04
Race (ref: White)				
Black/African American	-0.41	0.31	-0.24	-0.11
Other	0.03	0.41	0.05	-0.14
Gender (ref: male)				
Female	-0.48	0.33	-0.23	-0.08
Pell Status (ref: No)				
Pell Recipient	-0.81***	0.23	-0.41	0.09
Replacement status (ref: No)				
Replacement courses	0.21	0.22	0.02	0.11
Veteran Status (ref: No)				
Veteran	-0.19	0.36	-0.01	-0.09

*p<.05 **p<.01 ***p<.001

TABLE D-9: BALANCE CHECK FOR TOTAL CREDITS EARNED WITHIN TWO YEARS

Outcome: Total credits earned within 2 years	Logistic regression		Standardized Difference	
Covariates	Coefficient	Standard Error	Pre-match	Post-match
Age (ref: non-traditional)				
Traditional student	-0.22	0.21	-0.01	0.10
Full/part-time student (ref: part-time)				
Full-time	0.31	0.20	0.13	-0.04
Race (ref: White)				
Black/African American	-0.27	0.28	-0.18	-0.11
Other	0.00	0.39	0.03	-0.05
Gender (ref: male)				
Female	-0.58	0.30	-0.25	-0.03
Pell Status (ref: No)				
Pell Recipient	-0.80***	0.21	-0.38	0.01
Replacement status (ref: No)				
Replacement courses	0.26	0.20	0.06	0.03
Veteran Status (ref: No)				
Veteran	-0.13	0.32	0.01	-0.13

*p<.05 **p<.01 ***p<.001