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Executive Summary

The SATTS administered a TAACCCT Round 4 institutional grant with a primary goal of applying competency-based education (CBE) to a wide range of career and technical education (CTE) and applied technology programs. The SATTS envisioned using the TAACCCT funds to make its curriculum "more open to the larger environment and successful in transitioning students into employment and further education" (Salt Lake Community College, 2014a). Whereas the SATTS had implemented a form of CBE in the past, the TAACCCT grant provided the opportunity to update CBE to a more current and potentially more impactful model. The version of CBE that SATTS envisioned would shift away from using seat-time, clock-hours, and predominantly face-to-face instruction to credentialing students upon mastery of competencies. This new vision of CBE began to emerge when SLCC joined the Competency-based Education Network (C-BEN) in 2010, making it one of the first community colleges in the nation to join C-BEN, with the TAACCCT grant providing the resources and momentum to scale CBE throughout the SATTS. To this end, the SATTS designated 20 high priority programs of study (POS) to enable students to master industry-focused competencies and obtain credentials to secure living-wage employment.

This final third-party evaluation (TPE) report integrates findings from the interim report submitted to Salt Lake Community College (SLCC) and subsequently to the US Department of Labor (DoL) in October 2016 (Bragg, Cosgrove & Cosgrove, 2016) and all evaluation activities through August 31, 2018. This report addresses the DoL requirements to evaluate implementation of the grant-funded POS and all other strategies funded by the grant, as well as to determine the outcomes and impact of the POS using a quasi-experimental design in the form of Propensity Score Matching (PSM). The evaluation had three distinct but also interlocking parts: implementation evaluation, program enrollment and outcomes evaluation, and impact evaluation. Evaluation questions pertaining to each part of the evaluation follow:

Implementation Evaluation Questions

- What programs of study (POS) and strategies were funded by the TAACCCT grant, and how were they improved or expanded using grant funds?
- How were participant abilities, skills, and interests assessed to select and enroll individuals in the grant-funded POS?
- What contributions did the partners and other key stakeholders make to the grant-funded POS, and what factors affected partner involvement?

Program Enrollment and Outcomes Evaluation

- Who enrolled in the grant-funded POS?
- What are the program completion and award (certificate) rates, and what are the demographics and other characteristics of students who attained these outcomes?
- What employment outcomes are associated with POS participation in terms of employment and wage changes, and how are these outcomes related to student demographics and other characteristics?

Impact Evaluation

- What is the average effect of the grant on program completion?
- For program completers, what is the average effect of the grant on employment and wage change?

Multiple methods were used to conduct the evaluation, including document review (e.g., quarterly performance reports and annual performance reports); site visits including interviews and focus groups with students; classroom observations and faculty interviews; online surveys of faculty, and telephone interviews of a range of stakeholders, including employers. Quantitative data were gathered and

assembled by the SATTS grant team into a student-level data file used by the TPE to measure enrollment, outcomes, and impact. This file contained institutional data from SLCC and Unemployment Insurance (UI) wage records from the Department of Workforce Services (DWS) that were integrated, de-identified and transmitted to the TPE using a secure data transmission process. Descriptive and inferential statistical analysis were performed on the student-level data to evaluate POS enrollment and educational and employment outcomes. Results were disaggregated on demographics and other student characteristics that were also used as control variables in the impact study. A quasi-experimental design (QED) using Propensity Score Matching (PSM) was conducted to assess the impact of CBE on program completion, employment, and wage gain. Limitations pertaining to data access, measurement, and the QED are described in the full report

Implementation Evaluation

The TAACCCT grant enabled the implementation of improvements in the form of CBE and other student supports to 24 programs of study (POS). Six of the 24 POS offered the Certificate of Completion (CC), representing a long-term certificate, six offered the Certificate of Achievement, representing the shortest term certificate offered under the grant, and 12 POS offered the Certificate of Proficiency (CP), representing awards between the CC and CA levels. POS offering the CP award were most predominant throughout the grant.

CBE conversion was key to this TAACCCT grant, and this curriculum development process varied from one POS to another. Most POS were impacted by the CBE reform in the first two years of the grant but some lagged behind and a few were disconnected due to low enrollment or other challenges with implementation. Ultimately, however, the majority of POS were converted to CBE at the Tier 3 or higher level, meaning 50% or more of the curriculum was converted to CBE at the time students began enrollment in the POS. Students who started in a POS converted to CBE at Tier 3 or higher experienced a substantially reformed CBE curriculum from their first enrollment to their completion of the POS.

Another important aspect of the grant was reform of student services including student recruitment, onboarding, retention, and academic and career advising. Throughout the grant but especially in the last year of the grant, concerted attention was paid to improving student services, including developing new policies and processes directed at student success. Important developments in the area of student supports included improving relationships among campus units, improving marketing and communications with students, and redesigning a wide range of student supports such as onboarding and initial advising.

Efforts were also made to enhance Recognition for Prior Learning (RPL) under the grant in order to positively impact student retention and completion, including making efforts to increase understanding of what RPL means and how students can access and benefit from participating in it. To this end, progress was made on aligning SATTS policy to SLCC policy to ensure that students are able to benefit from RPL. Efforts were also made to enhance career services, including improving student referral to the SLCC Career Center and improving follow-up to non-completers. A number of recommendations were also made in this area, including offering professional development to assist faculty and staff to understand the services provided by the Career Center and improving student tracking post-enrollment.

Employer engagement was another important strategy in the grant, with the SATTS using grant funds to enhance its already extensive Program Advisory Committee (PAC) efforts. Results showed that many employers who participate in the PACs hold positive perceptions of SATTS students, including commenting favorably on students who work for them as interns and/or become full-time employees. Opportunities for further improvement were identified through the grant, including identifying ways to increase participating of more employers to deepen and enhance their support for program improvement through the CBE conversion process.

Also, considerable time and attention was dedicated to data collection using funds from the TAACCCT grant. A student file was created and utilized during years 2-4 of the grant to document student

enrollment, program outcomes, credential attainment, and employment. The grant's plan to use funds to increase data collection and use for program improvement and scale evidence-based reforms to other units of SLCC materialized under the grant, and time will tell whether these efforts to use data for continuous improvement will be sustained.

Program Enrollment and Outcomes Evaluation

Enrollment in the grant-funded POS exceeded the target enrollment of the grant set at 1,054 by reaching 1,114 students. The total number of grant participants was reported by the SLCC grant team in the final DoL performance report and represents 60 students (or 6%) more than the target number. Participants in the TAACCCT grant are more highly diverse on race/ethnicity than the general SLCC student population, with nearly 24% of the evaluation sample being Hispanic/Latino compared to 17% in the overall SLCC student body. Other racial/ethnic groups, African American, Asian, and Native American, were more highly represented in the evaluation sample than the campus, though the difference was modest compared to the Hispanic/Latino group. Logically, the White student group represented 62% of the evaluation sample compared to 68% of the overall campus (National Center for Education Statistics, n.d.).

Consistent with SATTS policy, test scores from TABE were used to assess student placement and also made available to the TPE team to measure pre-grant academic performance. Data gathered by the TPE showed only a small percentage of students (13%) placed into remediation based on the TABE test results indicating that most students who enrolled in grant-funded POS were able to enroll without having to address remedial requirements. The distribution of student enrollment by the six Career Clusters designated in the grant revealed three Clusters (Cluster 1 offering Administrative Office Specialist etc., Cluster 2 offering Computer Support Specialist etc., and Cluster 4 offering Electronics Technician etc.) made up about 70% of the total grant enrollment. Descriptive results showed student demographics varied substantially by Cluster, with Clusters 1 and 3 offering administrative and health-care related occupational training showing a higher percentage of females than the other Clusters; Very low percentages of students were female in Clusters 4 and 6 offering electronics and trade-related occupations. These results suggest the sex of students was associated with enrollment in POS and Career Clusters in ways typically considered traditional to their sex (e.g., healthcare for females and trades for males).

The number of evaluation sample students who completed a POS during the grant was 263, representing 36% of the sample. However, this finding may under-represent actual program completion since 10 of the 24 POS funded by the grant did not enroll students until the 2017-18 academic year, and many POS required one or more years of clock hour equivalency in order for students to complete the program and receive an award. In fact, results show that 110 (15% of 730) students were enrolled at the time data collection ended on June 30, 2018. By removing these students from the denominator, the adjusted completion rate rose to 42.4%, which reflects an improved program completion rate for SATTS. Knowing many students are incumbent workers and attending on part-time, using the adjusted completion rate seems logical and relevant to measuring the program completion outcome.

Results also showed POS completion rates varied widely and these varied rates are also reflective in Career Clusters (as reported in the main report). Completion rates for programs range from 0% for five POS (Air Cond/Heat/Refrig Technician, Automation & Instrumentation Technician, Diesel Maintenance Technician, Network Administration, and Network Infrastructure Technician) to 50% or higher for six POS: Professional Truck Driving (74%), Clinical Medical Assisting (70%), Clinical Nursing Assistant (63), Electronics Technician (53%), and Media Design Technican and Health Information Specialist (50%). Moreover, the completion rate for five sub-groups identified as important to the grant was comparable for the female and students of color sub-groups to the overall completion rate of the total evaluation sample. The completion rate of incumbent workers, representing an important target group of adult learners for this grant, was slightly higher (38%) than the total evaluation sample. Other sub-groups, first time college students and Pell grant recipients, showed substantially higher completion rates than the

total evaluation sample, at 44% and 47%, respectively. These descriptive results show grant target groups were completing POS at a similar or higher rate than the overall evaluation sample. Two other target groups, eligible veterans and TAA recipients, were not included in this analysis due to missing and spurious data found in the file transmitted to the TPE.

Results on completion rates by award level show the shortest award, the Certificate of Achievement (CA), had the highest completion rate at 55%. The completion rate for the Certificate of Completion (CC) and Certificate of Proficiency (CP) awards was identical at 28%. It is noteworthy that the CP award level accounts for half of the POS and also approximately half the participants in the evaluation study, thus results for this award level had a major influence on the overall completion rate.

Completion rate by CBE Tier varied as well, with Tiers 3-5 being ones that the SATTS considered implementing CBE at a level that students could experience the reform. The preponderance of enrollees were participating in POS at Tier 3 that showed a completion rate of 21%, well below the overall unadjusted program completion rate of 36%. The completion rate for Tier 4 was even lower, at only 10%, but the completion rate for Tier 5 was much higher at 63%. Moreover, the completion rate for the other CBE Tiers, specifically the Non-CBE and Tier 1 including curriculum that was not yet converted to CBE, was also relatively high at 59%. By comparison, the completion rate for Tier 2 that also had not begun CBE conversion was 28%. Reasons for these varied rates may have to do with the extent to which CBE conversion met with challenges in implementation, the varied enrollment of student populations conducive to completion in a relatively brief amount of time, and other factors.

One last aspect of students' educational experiences relates to a strategy linked to CBE called acceleration. This notion of acceleration was computed by comparing the time for POS completion during the grant to the expected clock hours to POS completion prior to the grant when clock hours dictated progress. Results showed acceleration was occurring for the majority of program completers in the grant, with nearly 60% of them demonstrating accelerated completion. Over 80% of the program completers completed their POS at a pace considered faster than a typical pace (i.e., accelerated pace) or at an on-time pace, based on historical practices.

Results show 57% of the program completers were employed after completing their POS and the completion rates varied considerably by award level. Students who completed POS offering the CA were less likely to be employed post-training than students who completed POS offering the CP and CC. The completion rates for all three award levels were considerably lower (ranging from 23% to 26%) for the non-incumbent program completion group than the total program completion group. These results suggest students who were employed prior to enrolling in grant-funded POS were also much likely to be employed post-training than the total program completion group.

An interesting pattern emerged for incumbent and non-incumbent program completers with respect to wages. These results show finishing a POS offering the shortest award (i.e., CA) shows the highest mean quarterly wage (and standard deviation) in the first quarter post-training. Why the first quarterly wage post-training would be higher for the shortest award than the other lengthier awards is unclear and should be read with caution. It is possible that the relatively small number of program completers included in this analysis will not be representative of program completers as the CBE conversation process proceeds.

Impact Evaluation

QED results suggest that TAACCCT program enrollment increased the odds of program completion by 44.7% over the baseline odds. However, when this analysis was performed including CBE level (relative to Level 1) and award level (relative to the CA), a negative likelihood of program completion was found, and this negative effect on the baseline odds ranged from a decreased odds of program completion by 70% to 95% for Level 2 and Level 4, respectively. CBE level 2 involved POS that had not yet converted to CBE but Level 4 had converted, with the application of the SATTS' quality framework.

A relationship between favorable post-program employment and program enrollment was not observed in the analysis. Post-program employment was gauged as either employment in the quarter immediately following program completion, or employment during any quarter two years out from program completion. In this model examining employment outcomes the CBE levels again signaled a negative effect on the likelihood of employment whereas the award level was statistically insignificant; however, award level had a positive effect relative to the odds of employment. Intuitively, an individual's status as an incumbent worker substantially increased the odds of post-program employment.

Program enrollment was associated with a substantial and statistically significant increase in postprogram wages. Controlling for demographic variables and the CBE level of a student's POS, TAACCCT program participation was associated with an average post-program quarterly wage increase of \$674.70. This model also predicted that incumbent workers' quarterly wages were, on average, higher compared to non-incumbent workers to the magnitude of approximately \$550.00. Examining the highest quarterly wage earned across two years (i.e. eight quarters post-program completion) revealed an even greater premium associated with TAACCCT program enrollment; for this outcome, program enrollment was associated with a higher quarterly wage of \$1,423 compared to the wage earners in the control group.

The SLCC grant was provided generous resources and momentum to convert a sizeable portion of the SATTS CTE and applied technology curriculum to competency-based education (CBE). Though the process was not easy or quick, administration, faculty, staff and students involved in granted-funded POS experienced substantive outcomes despite having to overcome challenges. CBE is a forward thinking, comprehensive reform strategy that extends to nearly all aspects of a college education and therefore also touches nearly all institutional policies and practices. Engaging in such ambitious reform is necessarily complex and especially demanding in the context of the TAACCCT grant. Even so, stakeholders associated with the grant persevered to change 24 POS and numerous student support strategies designed to increase student success. Chief among these strategies were efforts to improve student recruitment, onboarding, and academic and career advising.

Because the CBE conversion process is so extensive, the SATTS needs more time to implement changes to curriculum and support services. Lessons about coordinated communications and coordination within SATTS need to be encouraged and supported throughout SLCC considering that other units are seeking to implement CBE reform. Participatory decision-making processes such as those conducted in year 4 of the grant, including facilitation by the TPE, need to continue to be encouraged and supported so that the interdependent relationships that are required to implement CBE happen consistently and smoothly. To this end, the use of data to track student progress, including the full implementation of a Learning Management System (LMS) that can provide fine-grained results for students progressing through particular and multiple POS are needed. This evaluation revealed very few students participating in multiple POS but the TPE is uncertain whether this finding accurately depicts student behavior or is an outcome of the particular way data were collected for the grant.

Finally, the SATTS and SLCC personnel are encouraged to continue to implement CBE and also learn from this evaluation to link student-level data to CBE implementation in more informative way. Results of this evaluation provide a mixed assessment of the impact of CBE on student outcomes. Some evidence of increased program completion from POS enrollment emerged from the study, but these positive results were dampened for students who enrolled in some POS converted to CBE. Lessons on how to develop curriculum that is consistently positively impactful is needed. On the other hand, knowing that, on average, POS completers show impressive wage gains upon entering employment post-training is an important finding that suggests further strengthening of the PACs and employer engagement could pay off for the SATTS in terms of wage benefits for students.

Introduction

Salt Lake Community College (SLCC) is the largest and most diverse institution of higher education in Utah, serving a head-count enrollment of approximately 42,000 per year (National Center for Education Statistics, n.d.Fall 2016 IPEDS Data Center). One of the six schools within SLCC is the School of Applied Technology and Technology Studies (SATTS), and this school is dedicated to preparing students for employment through non-credit and credit applied technology and career-technical education (CTE) programs of study (POS). The SATTS is actually a fairly new school within SLCC having been integrated into the College in 2009 from the Utah College of Applied Technology (UCAT). Now, as part of SLCC, SATTS is continuing a long history of offering applied technology and CTE curriculum for the Salt Lake area. As such, the SATTS serves as the primary source of postsecondary CTE in Salt Lake County, the largest county by population in the state. To this day, the SATTS retains its original mission with UCAT to deliver "high-quality career and technical education to individuals seeking job skills for quick entry into the workforce" (Salt Lake Community College, 2016).

The SATTS administered a TAACCCT Round 4 institutional grant with a primary goal of applying competency-based education (CBE) to a wide range of CTE and applied technology programs of study (POS). The SATTS envisioned using the TAACCCT grant funds to make its curriculum "more open to the larger environment and successful in transitioning students into employment and further education" (Salt Lake Community College, 2014a). Whereas the SATTS used a more traditional form of CBE in the past, this grant provided the opportunity to update CBE to a potentially more impactful approach. The version of CBE that SATTS envisioned would shift away from using seat-time, clock-hours, and predominantly face-to-face instruction to credential students upon their mastery of competencies and completion of POS.

This new vision of CBE began to emerge when SLCC joined the Competency-based Education Network (C-BEN) in 2010, making it one of the first community colleges in the nation to join C-BEN (Wertheim, 2016). Four years later, when the TAACCCT Round 4 institutional grant was announced, the SLCC leadership formalized its CBE framework and began to scale CBE to the SATTS entire, designating twenty (20) high priority POS to begin this process. The TAACCCT Round 4 grant provided a focus, momentum and resources to solidify a CBE model that emphasizes mastery of competencies and provides services and supports that enable students to complete their POS, obtain credentials, and secure employment (see Appendix A for SLCC's description of the CBE approach).

This final third-party evaluation (TPE) report (Bragg, Cosgrove & Cosgrove, 2016) integrates findings from the interim report submitted to Salt Lake Community College (SLCC) and subsequently by SLCC to the US Department of Labor (DoL) in October 2016. This report also includes results of all subsequent evaluation activities conducted since that interim report's submission through to June 30, 2018. This TPE report addresses the DoL requirements to evaluate implementation of POS and all other strategies funded by the grant, as well as to assess outcomes and impact of grant-funded POS using a quasi-experimental design in the form of Propensity Score Matching (PSM).

The TAACCCT Round 4 Grant

SLCC was awarded a TAACCCT Round 4 institutional grant, named locally as Adult Competency-based Education Design (ACED), to implement and scale a formalized CBE approach to applied technology and CTE in 20 POS. The grant provided funding for the SATTS's CBE conversion process, along with implementation of Recognition of Prior Learning (RPL); improvement of program advisory committees (PACs) and employer engagement strategies; enhancement to student recruiting, on-boarding, advising, career development, and other student services and supports; and improvements of data collection, analysis and utilization for continuous program improvement.

At the time the TAACCCT grant was awarded, the SATTS had already committed through C-BEN to extend CBE to more CTE curriculum and also expand to the general and transfer curricula, as appropriate. Over the course of the grant, this scaling process unfolded as the grant team worked with the SATTS faculty and the campus' Instructional Design (ID) unit to transform POS into the new CBE format. This CBE reform, along with numerous other grant-funded strategies, sought to facilitate student retention and completion in POS offering one of three award levels (Completion of Achievement, Certificate of Proficiency, and Certificate of Completion) that may also lead to an associate's degree and possibly also a bachelor's degree after transfer, if a student chooses to pursue a more extended career path.

SLCC envisioned the TAACCCT grant as a vehicle to improve POS though especially beneficial to adult learners, including veteran and TAA eligible students, as well as low-income students, first-generation college students, and racial and ethnic minority students of any age. Consistent with the TAACCCT grant expectations, grant-funded POS prepared students to attain employment that leads to enhanced economic circumstances. The TAACCCT grant application (Salt Lake Community College, 2014a) captured these key concepts in a graphic that we replicate in Figure 1. This graphic clearly and succinctly shows target student populations and associates grant strategies to the student outcomes of improved learning, program retention, and program completion to reduce time and with less cost to the student.



Figure 1. Logic model included in the SLCC TAACCCT Round 4 grant application.

Building on SLCC's model, the TPE team worked collaboratively with the SATTS grant team to develop a detailed logic model during the team's first visit to the SLCC campus in February 2015. This model adds detail to the SLCC logic model graphic by presenting inputs, activities, outputs, and outcomes. Also documented in this new logic model is the overarching goal to "transform the School of Applied

Technology and Technical Specialties (SATTS) so that long-term, the SATTS is more open to the larger environment and successful in transitioning students into employment and further education." In February 2015, a large contingent of SLCC personnel met with the Third-Party Evaluation (TPE) team in Salt Lake City to refine and confirm the plan for evaluation of the grant. At this meeting and in subsequent meetings, the TPE assisted the SLCC to design and refine a detailed logic model for the project. An initial logic model was developed during the first meeting in February 2015 and updated in September 2016 when the grant interim report was completed. Minor changes were made to this logic model as the project evolved to reflect advancements in the theory of change through the full grant period, but these refinements did not offer substantive change but rather improvements to terminology and communications (see Table 1.)

Table 1

Overarching Goal: "Transform the School of Applied Technology and Technical Studies (SATTS) so that long-term the School is more open to the larger environment and successful in transitioning students into employment and further education."					
Inputs	Activities	Outputs	Outcomes		
 SATTS mission and mandate for short-term training Charter member CBEN Internal support and champions for CBE; Mixed buy-in to CBE by faculty and staff Partners: PACs, other employers, accrediting agencies SATTS well funded and resourced Adult students are primary target group – well aligned to grant Institutional players: instructional designers, IR, Student Services, Institutional marketing (internal and external) Open Educational Resources (OER) 	 Competency-based Education (CBE) curriculum development: course design, LMS, piloting of hybrid delivery Design and develop valid assessments for CBE, including materials and testing, student services and business models (e.g., subscription model). Enhance student services: including intake, orientation, advisement, and on-going engagement. Create a fair policy and process for federal financial aid Produce CBE support materials (training, handbook, new policies and procedures) Implement Recognition of Prior Learning (RPL) Improve the effectiveness of PACs and enhance employer concement 	 CBE courses LMS to support CBE CBE Handbook/PD Instructor Guide New Student Orientation Revised Intake System New internal partners New external partners Improved data capacity Marketing and Communications Plans 	 Student retention Program completion Credential completion according to Certificate of Achievement, Certificate of Proficiency, or Certificate of Completion Completion of multiple "stackable" credentials Time to completion (acceleration) Immediate employment Quarter-to-quarter employment retention Wage gain pre- to post- training Reduced cost of attendance 		

Logic Model Developed by SLCC and Third-Party Evaluation

Altogether, these strategies were expected to help the SATTS meet the specific needs of its students who are largely adult learners. The SATTS student population also includes Hispanic, Asian/Pacific Islander, African American, and Native American groups that are represented at nearly double that of the same group in the overall SLCC population. The CBE reform was expected to increase enrollment by low-income and underrepresented students who to POS, credentials and employment in middle skills jobs, and these practices were to be scaled to the other units on the SLCC campus and other higher education institutions interested in adopting CBE.

Implementation of the grant was envisioned to influence all aspects of the student experience. By developing a CBE model that uses a hybrid delivery approach that incorporates online learning, hands-on labs and assessments and mandated "meaningful contact" on a weekly basis between students and faculty, students were expected to be able to progress through their POS in an on-time or accelerated manner. Faculty could consult with the Instructional Design (ID) unit that employed professionals trained in instructional technology, CBE-instructional design, and assessment to convert applicable portions of their curriculum into the CBE format. The approach to CBE chosen by SATTS also specified supportive services for students including, improved student application, intake, and orientation processes that would be better coordinated with SLCC offices of the registrar, advising, student services, and the career center. These reforms were expected to improve students' educational outcomes by reducing barriers to attendance and accelerating time to completion. Enhanced engagement with business, industry, and was expected to provide input to the curriculum development process so that students graduating from grantfunded POS would be prepared to meet the needs of their future employers and have increased opportunities to secure living-wage employment.

Evaluation Questions and Methods

To assess the extent to which grant implementation was aligned with the TAACCCT grant expectations, the TPE analyzed the work plan from SLCC's proposal to ascertain implementation strategies planned for the grant (see Appendix B). In addition to reviewing the work plan to identify implementation strategies by dates and assignments, the TPE invited the SLCC grant team to share background and reference materials that it had used to prepare the TAACCCT proposal, including identifying frameworks and approaches that were used to guide SLCC's approach to CBE implementation. This information was useful to developing the questions that we used to guide the implementation, outcomes and impact evaluation in alignment with the DoL TAACCCT evaluation requirements. The evaluation has three distinct parts, implementation evaluation, program enrollment and outcomes evaluation and impact evaluation, and each of these parts has specific evaluation questions that are presented below.

Implementation Evaluation Questions

- What POS and strategies were funded by the grant, and how were they implemented, modified or expanded using grant funds?
- How were participant abilities, skills, and interests assessed to select and enroll individuals in the POS?
- What contributions did the partners and other stakeholders make to the POS, and what factors affected partner involvement?

Program Enrollment and Outcomes Evaluation

- Who enrolled in the grant-funded POS?
- What are the program completion and award (certificate) rates, and what are the demographics and other characteristics of students who attained these outcomes?

• What employment outcomes are associated with participation in terms of employment and wage change, and how are these outcomes related to student demographics and other student characteristics?

Impact Evaluation

- What is the average effect of the grant on program completion?
- For program completers, what is the average effect of the grant on employment and wage change?

Multiple methods were used to conduct the evaluation, including document review (e.g., quarterly performance reports and annual performance reports); site visits including personal interviews and focus groups; classroom observations; and online surveys. Site visits were held on regular intervals from the beginning to the end of the grant, starting in February 2015, May 2015, October 2015, September 2016, November 2016, February 2017, December 2017, and June 2018. An online survey focusing on the implementation CBE was administered to SATTS faculty in August 2016 and again in August 2017. This survey sought to understand faculty engagement in CBE, their perceptions of CBE curriculum development, and their assessment of curriculum created from the CBE conversion process.

Quantitative data were gathered by the SATTS grant team using data collection instruments (e.g., intake forms) created for the grant, as well as databases maintained by various SLCC units. These data were pulled by the SATTS grant team into a student-level data file at approximately the end of year one of the grant and thereafter on a consistent basis until the end of the grant, including querying these data to produce the annual performance report. Employment outcomes were provided to SLCC through an agreement between the Utah Department of Workforce Services (DWS) and the College. In very limited cases when DWS UI wage data were not available, self-reported data were used to supplement the employment data. Once the student-level data were transformed by the SATTS grant team into de-identified student records (i.e., removing all identifiable data such as SSN and College Student ID), the TPE was able to use these data to conduct the evaluation. To maintain the security and confidentiality of the student-level data, the TPE used Box.com to transmit and store data. Box.com is a secure cloud-based software application that allows for a single place to manage, secure, share and govern all content for internal and external collaboration.

Descriptive and inferential analysis were performed on student demographic characteristics, precollege characteristics, POS enrollment and outcomes, and employment outcomes (employment and wage gain). Results were disaggregated using a extensive set of demographic variables (gender, race/ethnicity, age, and so forth) that were also used as control valuables in the impact evaluation. A quasi-experimental design (QED) was conducted using a retrospective sample of students enrolled in similar POS offered by the SATTS and Propensity Score Matching (PSM) to assess the impact of the grant's primary treatment of CBE reform on selected educational and employment outcomes.

Limitations

The evaluation had several limitations. First, the DoL specified an ambitious evaluation design for the TAACCCT grant, requiring the evaluation focus on implementation evaluation, outcomes evaluation, and impact evaluation using experimental or quasi-experimental design (QED). Community college practitioners with limited experience with evaluation of any kind, let alone QED, lacked experience with a rigorous evaluation process. Without past experience, the evaluation required considerable time and effort by all parties to ensure that data were properly gathered and processed. The DoL provided a modest amount of training, but grantees were tasked with executing the evaluation largely on their own. It is possible that the limitations of this process contributed to some errors in data collection and data processing despite quality control measures used by the grant team and TPE. There is no reason to believe

that these errors are substantial, but some may exist and influence the results in unknowable ways.

With respect to specific aspects of the evaluation, some challenges emerged for the grant team in gathering outcome data, limiting the analysis that the TPE could perform. This included limitations to analyzing accelerated enrollment that the SATTS considered a high priority. Whereas an acceleration measure was created by the SATTS grant team, the measure produced results that were unanticipated and sufficiently unclear to cause the TPE to drop this measure from the impact study. Descriptive results are reported for the evaluation sample. However, questions about the integrity of this measure also lead the TPE to exclude the cost measure from the study to avoid presenting potentially misleading results. Also, whereas data were gathered consistently on some outcome measures, such as program completion by award level, missing data on some control variables anticipated for use in the QED led the TPE to make relatively minor adjustments to the QED though the study was largely representative of the original plan.

Finally, some constructs required to evaluate the impact of the treatment could not be measured because they pertained to the treatment group only. For example, the CBE model required measuring mastery of competencies rather than academic performance represented in course grades, which had been used by the SATTS in the past to measure student success. Under the grant, there was no comparable means of measuring academic performance (e.g., student learning) for a treatment and control group due to the decision of SLCC to use the TAACCCT grant to scale CBE to the entire SATTS curriculum.

Programs of Study (POS) and Grant Strategy Implementation

This section of the report provides a description of implementation of the TAACCCT grant by the SATTS, detailing the number of POS funded over the entire course of the grant and the ways in which the POS were impacted by curriculum changes, especially the CBE implementation process. This section includes a description of the credentials (also referred to as awards) associated with POS and Tier of CBE implementation wherein "Tier" refers to how extensive the CBE reform was implemented.

This section also describes other strategies specified in the negotiated scope of work (SOW) of the grant, including how various strategies were implemented in the grant. Strategies such as curriculum development, employer engagement and improvement of the Program Advisory Committees (PACs), student supports, and other reforms are described according to their implementation throughout the grant.

POS Implementation

In the TAACCCT grant application, the SATTS named 20 non-credit POS to be converted to CBE as the focus of initial grant activities. As the full scope of the grant evolved and became clearer, the SATTS realized that some POS were optimal choices for CBE conversion and some were not. To address this concern, the grant team received approval from the DoL to adjust the POS included in the grant. Thus, five POS were removed from the grant due to low enrollment and four POS were added through a formal grant modification beginning in last year of the grant, in the 2017-18 academic year. Thus, students enrolling after 7/11/17 were affected by this grant modification. In accordance with the DoL requirement that "once a grant student, always a grant student", the students in POS removed from the grant remained counted as grant participants in all formal reporting including the TPE. These modifications resulted in a total of 24 POS being included in the grant over the October 1, 2014 to September 30, 2018 period.

Also, as a way of organizing and understanding the large number of POS included in the grant, the SATTS grant team classified POS according to six career clusters that logically align to industry sectors important to the Salt Lake City region. Table 2 shows the 24 POS according to the six career clusters, with four POS aligned to each cluster.

Career Clusters	Grant-Funded Programs of Study (POS)		
1: Admin. Office Specialist etc.	 Administrative Office Specialist Accounting Clerk Health Information Specialist Medical Coding and Billing 		
2: Network Administrator etc.	 Computer Support Specialist Network Administrator Network Infrastructure Technician Network Engineering Technician 		
3: Clinical Lab Assistant etc.	 Clinical Lab Assistant Clinical Medical Assistant Medical Office Administration Certified Nursing Assistant 		
4: Electronics Technician etc.	 Automation & Instrumentation Engineering Technician Electronics Engineering Technician Electronics Technician Professional Truck Driving 		
5: Graphic Designer etc.	 Graphic Designer Media Design Technician Web Programmer Website Designer 		
6: Welding etc.	 Air Conditioning/Heating/ Refrigeration Heavy Duty Diesel Maintenance Technician Manual Machinist Welding 		

Twenty-Four POS Classified by the Six Career Clusters

In addition to aligning to career clusters, the POS are aligned to awards (i.e., credentials) that are designated according to clock hours for non-credit curriculum. According to the *Salt Lake Community College Policies and Procedures Manual* (Salt Lake Community College, 2014b) (see: http://www.slcc.edu/policies/docs/c4s02-10.pdf), credit hours and clock hours are defined based on the following definition of Full-Time Equivalent (FTE), which is "equal to the following unless otherwise specified by an individual agency (such as federal financial aid reporting requirements) of 1) 15 credit hours per semester / 30 credit hours per year, or 2) 450 clock hours per semester / 900 clock hours per year."

POS offered by the SATTS offer three levels of award: Certificate of Completion (CC) that aligns to 30-33 semester credit hours or 900-990 clock hours; Certificate of Proficiency (CP) that aligns to 16-29 semester credit hours or 600-899 clock hours; and Certificate of Achievement (CA) that represents shortterm training. Some of these POS also prepare students for industry-recognized credentials, and to the extent possible, these credentials were recorded by the SATTS grant team. Table 3 provides information about the award levels and conferring organizations, including whether or not the awards were approved by the SLCC Board of Trustees and Utah Board of Regents.

Award Levels	Credit Hours, Clock Hours and POS Description			
Certificate of Completion	30-33 semester credit hours or 900-990 clock hours			
	POS awarding the Certificate of Completion (CC):			
(CC)	• are approved by the SLCC Board of Trustees and the Utah Board of Regents.			
	• offer a coherent sequence of courses of typically one year in length. POS awarding CCs may be entry-level or may require prerequisites of related industry experience and/or previous course work or degree attainment.			
	• identify instructional components in communication, computation, and human relations that can be standalone general education courses or embedded within other program courses.			
Cartificata of	Award Level: 16-29 semester credit hours or 600-899 clock hours			
Proficiency	POS awarding the Certificate of Proficiency (CP):			
(CP)	• are approved by the SLCC Board of Trustees and the Utah Board of Regents.			
	• consist of a coherent sequence of courses typically less than one year in length.			
	• may be entry-level or may require prerequisites of related industry experience and/or previous course work or degree attainment			
	• are not eligible for federal financial aid.			
Certificate of	Award Level: No minimum or maximum length requirements or general education requirements			
(CA)	POS awarding the Certificate of Achievement (CA):			
	 are issued by an individual department, division, or school and not under the authority of the Board of Regents. 			
	• are typically designed to meet immediate workforce training or community education needs.			
	 have no minimum or maximum length requirements or minimum general education requirements. 			
	• are not recorded on a SLCC transcript and do not become part of a student's permanent academic record.			
	• are not eligible for federal financial aid.			

SATTS Awards Level by Credit Hours, Clock Hours, and Program of Study (POS) Description

Table 4 displays the 24 POS according to their career cluster and for each academic year over the four years of the grant from 2014 to 2018, whether the POS was included in the grant and the clock hours and award levels of the POS. This table provides detailed information about the grant-funded POS over the course of the grant, showing the status of the POS by academic year. The table also shows the clock hours and award level prescribed for the POS by academic year. These data allowed the TPE to associate student enrollment with POS implementation status as the grant proceeded over time.

Grant-Funded POS	Academic Year	Grant Status	Clock Hours	Award Level		
Cluster 1 – Administrative	Cluster 1 – Administrative Office Specialist etc.					
Administrative Office Sp	oecialist					
-	2014-2015	Yes	625	СР		
In Original	2015-2016	Yes	625	СР		
SOW	2016-2017	Yes	355	CA		
-	2017-2018	Yes	355	CA		
Health Information Spec	cialist					
	2014-2015	Yes	678	СР		
In Original	2015-2016	Yes	678	СР		
SOW	2016-2017	Yes	765	СР		
	2017-2018	Yes	645	СР		
Medical Coding and Bill	ing					
	2014-2015	Yes	803	СР		
In Original	2015-2016	Yes	803	СР		
SOW	2016-2017	Yes	865	СР		
-	2017-2018	Yes	865	СР		
Accounting Clerk						
	2014-2015	No	769	СР		
Added to	2015-2016	No	769	СР		
SOW	2016-2017	No	655	СР		
	2017-2018	Yes	615	СР		
Cluster 2 – Computer Sup	port Specialist etc.					
Computer Support Spec	ialist					
	2014-2015	Yes	615	СР		
In Original	2015-2016	Yes	645	СР		
SOW	2016-2017	Yes	600	СР		
-	2017-2018	Yes	600	СР		
Network Administrator						
	2014-2015	Yes	645	СР		
In Original	2015-2016	Yes	675	СР		
SOW	2016-2017	Yes	675	СР		
-	2017-2018	Yes	675	СР		
Network Infrastructure	Technician					
	2014-2015	Yes	825	СР		
In Original	2015-2016	Yes	865	СР		
SOW but Discontinued	2016-2017	No	0	NA		
-	2017-2018	No	0	NA		
Network Engineering Technician						
	2014-2015	No	855	СР		
Added to	2015-2016	No	895	СР		
SOW	2016-2017	No	895	СР		
-	2017-2018	Yes	895	СР		
Cluster 3 – Clinical Lab A	ssistant etc.					
Clinical Lab Assistant						
Le Onizie 1	2014-2015	Yes	345	СА		
In Original	2015-2016	Yes	345	CA		
50 W	2016-2017	Yes	365	CA		

Programs of Study by Cluster, Grant Funding Designation, Clock Hours, and Award Level

Grant-Funded POS	Academic Year	Grant Status	Clock Hours	Award Level		
	2017-2018	Yes	365	CA		
Clinical Medical Assisting						
	2014-2015	Yes	950	CC		
In Original	2015-2016	Yes	950	CC		
SOW but Discontinued	2016-2017	Yes	0	NA		
	2017-2018	Yes	0	NA		
Medical Office Administ	ration					
	2014-2015	Yes	940	CC		
In Original	2015-2016	Yes	940	CC		
SOW	2016-2017	Yes	835	СР		
	2017-2018	Yes	835	СР		
Certified Nursing Assista	ant					
	2014-2015	No	122	CA		
Added to	2015-2016	No	210	CA		
SOW	2016-2017	No	150	CA		
-	2017-2018	Yes	150	CA		
Cluster 4 – Electronics Te	chnician etc.					
Automation and Instrum	entation Technician					
	2014-2015	No	1362	CC		
Added to	2015-2016	No	1091	CC		
SOW	2016-2017	No	1091	CC		
-	2017-2018	Yes	1091	CC		
Electronics Engineering	Technician					
	2014-2015	Yes	1226	CC		
In Original	2015-2016	Yes	959	CC		
SOW but Discontinued	2016-2017	Yes	959	CC		
	2017-2018	Yes	959	CC		
Electronics Technician						
	2014-2015	Yes	192	CA		
In Original	2015-2016	Yes	192	CA		
SOW	2016-2017	Yes	192	CA		
	2017-2018	Yes	192	СА		
Truck Driving, Professio	onal					
	2014-2015	Yes	240	СА		
In Original	2015-2016	Yes	270	CA		
sow	2016-2017	Yes	270	CA		
-	2017-2018	Yes	270	CA		
Cluster 5 – Graphic Desig	ner etc.					
Graphic Designer/Graph	nic Technician (name cha	ange for 2016-16 Acad	demic Year)			
	2014-2015	Yes	645	СР		
In Original	2015-2016	Yes	675	СР		
sow	2016-2017	Yes	675	СР		
-	2017-2018	Yes	675	СР		
Media Design Technology						
	2014-2015	Yes	1275	CC		
In Original	2015-2016	Yes	975	CC		
SOW but Discontinued	2016-2017	Yes	0	NA		
	2017-2018	Yes	0	NA		
Web Programmer		- •••	-			
In Original	2014-2015	Yes	765	СР		
SOW but Discontinued	2015-2016	Yes	795	СР		

Grant-Funded POS	Academic Year	Grant Status	Clock Hours	Award Level	
	2016-2017	Yes	765	СР	
	2017-2018	Yes	765	СР	
Website Designer					
	2014-2015	Yes	675	СР	
In Original	2015-2016	Yes	705	СР	
SOW	2016-2017	Yes	705	СР	
	2017-2018	Yes	705	СР	
Cluster 6 – Welding etc.					
Air Conditioning/Heatin	g/Refrigeration Residen	tial Technician			
	2014-2015	Yes	960	CC	
In Original	2015-2016	Yes	1005	CC	
SOW	2016-2017	Yes	955	CC	
	2017-2018	Yes	955	CC	
Diesel Service Technicia	n				
	2015-2016	Yes	745	СР	
Added to SOW	2016-2017	No	745	СР	
	2017-2018	No	745	СР	
Manual Machinist					
	2014-2015	Yes	450	CA	
In Original	2015-2016	Yes	450	CA	
SOW	2016-2017	Yes	450	CA	
	2017-2018	Yes	450	CA	
Welding					
	2014-2015	Yes	1155	CC	
In Original	2015-2016	Yes	1105	CC	
SOW	2016-2017	Yes	1105	CC	
	2017-2018	Yes	1105	CC	

Source: Information extracted from the SLCC data file and updated on 8/28/18.

Cluster 1 includes POS that focus on administrative occupations, primarily in healthcare. Three of these four POS were included in the original SOW, with Accounting Clerk (CP level) added to the grant in 2017-18. Also noteworthy, the Administrative Office Specialist program decreased in clock hours by 43% resulting in a change from the CP to the CA award level.

The four POS associated with Cluster 2 offered the CP award and focused on computer- and networkrelated occupations, with one POS (Network Engineering Technician) added during the grant, and one POS (Network Infrastructure Technician) removed. Each POS saw some clock-hour change during the grant, with some increasing and others decreasing but all staying at the CP award level.

All four POS in Cluster 3 were associated with healthcare, with one POS, Certified Nursing Assistant (CNA), added in 2017-18, and one POS, Clinical Medical Assisting, removed. The Clinical Lab Assistant POS saw a slight increase in clock hours but remained at the CA level. Of note, the Clinical Medical Assisting POS was discontinued as a non-credit POS with the SATTS and transferred to the credit side of SLCC. The Medical Office POS shifted from CC to CP when the clock hours were reduced from 940 to 835.

Cluster 4 offered four POS in electronics-related occupations, with one POS, Automation and Instrumentation Technician, added, and one, Electronics Engineering Technician, removed. Two POS, Electronics Technician and Professional Truck Driving, were part of the grant from start to finish,

consistently awarding the CA, with the Professional Truck Driving POS increasing from 240 to 270 clock hours but remaining at the CA level.

Of the four POS in Cluster 5 that focus on media, website and graphics design, two POS, Media Design Technician and Web Programmer, were discontinued, and two, Graphic Designer and Website Designer, remained part of the grant to the finish. Both of these POS increased the clock hours but the award level stayed at the CP level throughout the grant.

Cluster 6 offered POS at all three award levels. The Welding and Air Conditioning POS offered the CC award, and Diesel Service Technician offered the CP award, whereas the Manual Machinist offered the CA award. Only the Air Conditioning POS changed clock hours during the grant, first increasing in year 2 but later returning to pre-grant level in year 3.

In summary, six of the 24 grant-funded POS offered the CC, six offered the CA, and twelve POS offered the CP (see Figure 2) at the conclusion of the grant. POS offering the CP award were most predominant throughout the grant.

Competency-Based Education (CBE) Development

One of the most important strategies funded by the grant was CBE curriculum development. The process of converting POSs to CBE included collaboration between faculty, administration, and instructional designers (IDs) in SLCC's Online & eLearning Services Division. The pace of



Figure 2. Percentage 24 grant-funded POS by award level.

CBE conversion depended on the content and complexity of the POS, the extent to competencies were identified for the POS prior to the grant, the engagement and support of the faculty, and the capacity of the ID/faculty team to complete the work. Though developed later in the grant than originally intended, a CBE training course was developed for the faculty (see:

https://onlinelibrary.wiley.com/epdf/10.1002/cbe2.1016). Some of the areas included in the training include integrating technology; identifying program competencies; matching competencies to program goals, Knowledge, Skills and Ability (KSA), learning objectives, and outcomes; and creating assessments.

The SATTS created a framework to track CBE progress as POS moved through the CBE conversion process. After several iterations, this framework came to be known as the "CBE Tiers" framework. The SATTS framework identified five distinct levels, with Tier 3 being the point at which a POS is considered ready for student enrollment and Tiers 4 and 5 representing varied levels of ID involvement and internal review. Distinctions among the five CBE Tiers are based on the extent to which curriculum is converted to CBE, the involvement of ID, the option for self-paced learning and open entry and/or exit, and the extent to which POS are internally evaluated using a SATTS-developed quality framework.

Figure 3 above depicts the percentage of POS that culminated at each CBE Tier, showing 84% of the POS achieved Tier 3 or higher by the conclusion of the grant, with Tier 3 meaning the POS reached at least 50% conversion to CBE when students enrolled and progressed through to completion.

The SATTS documented when each POS achieved a new CBE Tier as the grant proceeded and integrated this information into the student data file to enable the tracking of participants from the time of their initial enrollment to completion or exit from the grant.

Table 5 identifies each POS by CBE Tier by the end of the grant, including the date at which each POS reached its culminating Tier. Results show only



the date at which each POS reached its *Figure 3*. Percentage of POS by CBE Tier at end of the grant.

one POS was at Tier 1 at the end of the grant, with Tier 1 indicating that competencies are differentiated from learning outcomes but 15% or less of the content has undergone CBE conversion. This POS stayed at Tier 1 due to the program having been discontinued. Three programs reached Tier 2 due to their having more than 15% but less than 50% content having been CBE converted and their faculty having been oriented to the CBE process. The three programs culminating at Tier 2 were Air Conditioning, Heating Residential Technician, Electronics Technician, and Welding.

The SATTS defined Tier 3 as "offering CBE enrollment" with open entry and/or exit, selfpaced learning, program content developed mainly by faculty trained in CBE, and Instructional Design (ID) staff engaged in up to 50% of CBE conversion. Ten POS reached Tier 3 in 2015, with a total of 14 POS culminating at Tier 3 by the end of the grant. Of note, four Tier 3 POS were removed from the grant, with three of these POS removed due to low enrollment and one moved to a credit POS offered by another unit of SLCC. Of the remaining 10 POS, five reached Tier 3 in 2015, one in 2016, and four in 2017.

"Tier 3 is the point at which programs are distinguished as CBE. This is when students have a choice to participate in a clock hour-based or CBE program. Tier 3 creates a foundation for continuous improvement, and Tier 4 introduces internal evaluation through our quality framework."

-Dean, SATTS

The ID unit worked with SATTS faculty to develop more than 50% of the content in POS at the CBE Tier 4 level. POS at this level were also reviewed using a rubric developed by the SATTS and the eLearning Division of SLCC. Three POS (Administrative Office Specialist were added to the grant in 2015, Health Information Specialist added to the grant in 2016, and Medical Coding and Billing added to the grant in 2016) reached CBE Tier 4 by the conclusion of the grant. Tier 5 designated POS developed (or intended to be developed), with 100% collaboration between faculty and the ID unit. Three POS culminated at

CBE Tier 5: Diesel Service Technician, Manual Machinist, and Truck Driving. However, only one of these POS enrolled participants during the grant, with two reaching Tier 5 in July 2018 after grant enrollment concluded. Thus, the only grant participants to have experienced CBE Tier 5 were students enrolled in Professional Truck Driving after January 2017.

Table 5

Competency-based Education (CBE) Tier by Program of Study (POS) and Date of Highest Tier

CBE Tier	CBE Tier Description	Date of Highest Tier Culmination
Tier 1	CBE Development Pipeline: Competencies defined from learning outcomes and in queue but less than 15% developed for CBE delivery.	
POS Culminating in Tier 1	1. Media Design Technology (discontinued)	11/1/2015
Tier 2	CBE Development: More than 15% revised for CBE delivery, with faculty oriented to department and SATTS CBE design, development, a delivery policies and procedures.	nd
POS	2. Air Conditioning/ Heating/ Refrigeration Residential Technician	7/1/2015
Culminating	3. Electronics Technician	2/15/2016
in Tier 2	4. Welding	7/15/2017
Tier 3	CBE Enrollment: Open-entry and/or –exit, variable-paced learning including accelerated progress, 24/7 support, accessible content and extended access to instructional support, courses developed by CBE-train faculty, and ID/IT/AD collaboration in less than 50% of CBE developed	ined ent.
	5. Accounting Clerk (added)	8/15/2017
	6. Automation and Instrumentation Technician (added)	8/15/2017
	7. Certified Nursing Assistant (added)	7/15/2016
	8. Clinical Lab Assistant	9/15/2015
	9. Clinical Medical Assisting (discontinued)	1/15/2015
Programs	10. Computer Support Specialist	7/15/2015
Culminating in Tier 3	11. Electronics Engineering Technician (removed from grant due to low enrollment)	8/15/2017
	12. Graphics Designer/ Graphics Technician	3/15/2017
	13. Medical Office Administration	9/15/2015
	14. Network Administrator	7/15/2015
	15. Network Engineering Technician (added)	1/15/2015
	16. Network Infrastructure Technician (discontinued)	1/15/2015

CBE Tier	CBE Tier Description	Date of Highest Tier Culmination
	17. Web Programmer (removed from grant due to low enrollment)	3/15/2017
	18. Website Designer	3/15/2017
Tier 4	CBE Enrollment with Partial External Review: ID/IT/AD collaboration with faculty in more than 50% of development. Internal quality framewor for CBE curriculum review.	on ork
Drograms	19. Administrative Office Specialist	9/15/2015
Culminating	20. Health Information Specialist	11/1/2016
in Tier 4	21. Medical Coding and Billing	11/1/2016
Tier 5	CBE Enrollment with Full Partnership between ID/AD and Instruction: ID/IT/AD collaboration with faculty in 100% of development	ent.
Programs	22. Diesel Service Technician	7/15/2018
Culminating in Tier 5	23. Manual Machinist	7/15/2018
	24. Truck Driving, Professional	1/15/2017

Source: Information presented in this table is extracted from the SLCC Data File (updated on 8/28/18), the SATTS CBE Tier Document (dated 2/4/17), and a debriefing telephone conference call with the SATTS grant team on 8/30/18.

Reflecting on what happened in the grant, the CBE conversion process proceeded at a varied pace according to the assigned POS, with the initiation of CBE in the first two years of the grant for most POS but lagging for a few. By the conclusion of the grant, some POS initially expected to experience CBE conversion had insufficient enrollment to continue in the grant or experienced other challenges to the implementation process. Some of these POS were disconnected, but discontinuation was in the minority. As noted above in Table 5, the majority of POS advanced to Tier 3 or a higher Tier during the grant.

Student Services and Supports

Due to multiple points of entry and exit associated with student enrollment in the CBE curriculum, plus the need to track the self-paced completion of competencies, the conversion of POS to CBE prompted greater focus on student services. SLCC leaders had already recognized at the time of proposing the TAACCCT grant that they would need to modify and improve student services, including creating an improved student tracking system to accommodate CBE. Unfortunately, throughout most of the grant, SLCC was not able to identify a learning management system (LMS) that met the needs of the CBE curriculum, which was problematic because the lack of an LMS meant faculty had to track student progress themselves. Such efforts added time and burden to faculty work load because they had to develop their own systems to monitor student records documenting the mastery of competencies and progress toward completion (also complicating the ability of the grant team and TPE to record progress during the grant). As the grant progressed, consensus grew among many groups (i.e., SATTS administration, grant team, faculty, and staff) that an LMS was needed in order for CBE to succeed, and efforts continued toward identifying a suitable system. An online survey conducted by the TPE during

years 2 and 3 of the grant documented serious concerns of faculty that were discussed extensively in the TPE interim report (Bragg, Cosgrove & Cosgrove, 2016).

Also, the SATTS team recognized the need for proactive student services from the start of the grant and included this strategy in the grant proposal. However, progress on reforming student services lagged until

near the conclusion of the grant, slowing improvements to student recruitment, onboarding, and academic and career advising. Eventually though, considerable effort was made to improve student services and offer more extensive effort to putting new policies and processes in place directed at student success. Potentially complimentary reforms taking place across SLCC were aligned with changes to student services of SATTS, with plans for more change in the 2018-19 academic year, and beyond. To this end, the TPE was involved in a series of focus group meetings to gather information to help SLCC and SATTS align various student success efforts that are progressing into the future.

"We need to involve advisors more in the weekly interventions, and we need to leverage technology and standardize processes. We need advisors to know who is completing and who is not. We need data about retention to be shared between faculty and advisors." -SATTS/SLCC Student Services Focus Group

(April, 2018)

Another important development associated with student success that has emerged from the grant is the identification of a set of student success strategies that including implementing improved articulation, improving relationships and communications among campus units, and increasing recruitment, onboarding and advising. Recommendations pertaining to these aspects of the grant, including strategies pertaining to data collection and continuous improvement, are important for SLCC to continue to pursue in the future.

Recognition for Prior Learning (RPL)

Recognition of Prior Learning (RPL) was written into the SOW as a grant-funded strategy and is also mentioned in numerous SLCC documents as a key strategy for CBE. The SOW specified that SLCC would implement RPL in years 2 and 3 of the grant, thus timing for this strategy was expected to pick up in year 2 and run through the end of the grant. During each TPE site visit, SLCC administrators mentioned that RPL was an evolving strategy that needed more attention. To this end, the TPE documented campus level as well as SATTS level implementation of RPL, including challenges to implementation. For example, at the campus level, SLCC established the Center for Prior Learning as part of the grant, and this Center operated under the direction of the Associate Dean for ESL, College Readiness, and Testing. However, the Center is not located on the main campus of SLCC but rather at the South City Campus. This unit is the hub for evaluation of any prior learning activities that students would like evaluated and so the notion of centralization seems useful but not necessarily convenient for students who attend POS offered on other campuses. However, to accommodate students, the grant lead worked with the Director of the Center for Prior Learning and Associate Dean to ensure that this Center was functioning in a way that would benefit SATTS students. Efforts were made to reduce confusion among faculty, staff and students about the role of the Center and about what RPL means and how students can to participate in it. Lack of understanding of RPL among these various groups, especially students, was attributed with the reason very few student accessed RPL during the grant.

To improve RPL implementation an expert in Prior Learning Assessment (PLA) was added to the TPE team in the last year of the grant. This individual was tasked with gathering data on RPL implementation

and engaged in evaluation efforts, including conducting telephone interviews with key stakeholders using an established PLA framework (Hoffman, Travers, Evans, and Treadwell (2009; Travers, 2013). Many recommendations were offered by this expert to enhance RPL implementation in ways expected to positively impact students, including developing one common name for RPL so that students can identify and understand what it is and how to access it, and aligning SATTS policy to SLCC policy to ensure that students understand the variety of ways that they can benefit from RPL. Recommendations were also made to the SATTS and SLCC executive levels to visibly endorse RPL, including offering professional development for faculty and staff.

Assessments and Career Guidance

At the time the grant began, the SLCC decided to use the Test of Adult Basic Education (TABE) to test students' college readiness. However, if students had already taken other assessments, they were treated according to institutional policy that resulted in their taking tests prescribed according to prior SLCC test policy. Consistent with new policy, test scores from TABE were used by the SATTS to assess student placement and also made available to the TPE team to measure pre-grant academic performance. Data gathered by the TPE for this evaluation showed only a small percentage of students (13%) placed into remediation based on the TABE test results. Though not inconsequential for those students who were required to participate in remediation, most students participating in the grant enrolled in POS directly without remedial requirements.

The career guidance offered to SATTS students was led by SLCC's Career Center. SATTS advisors reached out to the Center to notify them when a student completed their POS. At least six contacts were made to provide students with career information. Some SATTS advisors were identified by faculty and staff as engaging students in career searches, and some faculty were identified as playing an important role in connecting students with employment opportunities. Several recommendations were made to enhance career services as part of the TPE process, including improving student referral to the Career Center, improving follow-up to non-completers, improving data tracking, and offering professional

development to assist more faculty and staff in understanding the services provided by the Career Center and how these services intersect with student enrollment, retention, and completion.

Program Advisory Committee (PAC) and Employer Engagement

SLCC administrators indicated during the TPE site visits in October 2015 and September 2016 that the Program Advisory Committees (PACs) were highly valued and recognized as important to the CBE conversion process. Based on interview data gathered from faculty, as well as documentation supplied by the grant team, some PACs were engaged more actively than others in the CBE conversion process. To this end, the TPE received a set of 2015 PAC reports on 12/23/15 for the following programs: Electronic Technology; Clinical "The programs were very good. The students were prepared. I took on dozens of interns and hired probably 20 or more into full-time positions. Many of them have moved on to supervisory positions making good money and have been very successful for the most part. You are always going to have some who don't work out, but we have been very happy with the level of professionalism of these workers."

> -SATTS Program Advisory Committee (PAC) Member

Medical Assistant; Computer Technology; Media & Web Design; Office Information System, Medical; Office Information Systems, Office; and Professional Truck Drive. Each report summarized PAC discussions, activities, concerns, and accomplishments, but did not reveal employers offered input on the CBE conversion. Later data collection focusing on filling this gap did reveal that several PACs were involved in identifying competencies and reviewing curriculum offerings, with healthcare, electronics, graphics design, and several other POS modeling approaches to employer engagement in curriculum reform.

In spring 2018, the TPE team conducted telephone interviews with employers to gather information about how the PACs were operating from the employer perspective and make recommendations for improvement. These findings showed many employers were active participants in their respective PACs, and they articulated appreciation for sharing input with faculty. They also held positive perceptions of SATTS students, including commenting favorably about students who worked as interns or became their employees. Recommendations offered to SATTS personnel during a strategic planning meeting held in June 2018 included enhancing employer participation in the PACs even further by ensuring active rotation of employers on and off the PACs over time to ensure fresh perspectives and encouragement to engagement employers beyond the PAC meetings. Whereas many employers who were engaged with the SATTS were active and supportive, there was a sense from various stakeholders knowledgeable about SATTS operations that more employers could participate in SATTS activities to deepen support for program improvement.

Data Collection and Continuous Improvement

The SATTS leadership was especially appreciative of the need to use grant funds to gather data to track students from enrollment to completion to employment. To this end, the data system created for the grant, including the data for performance reporting and the TPE, linked data for purposes of student tracking. Considerable time and attention was dedicated to this effort throughout the grant using the TAACCCT funds. Creation of the student file began in year 2 of the grant and continued through to the end of year 4, with consistent efforts to update the file and add variables potentially useful to documenting student enrollment and outcomes. The final version of the student file was completed on approximately June 30, 2018 when data collection ended and the TPE was given access to final de-identified student-level file.

"We're investing a lot of effort in local CBE projects, and we need to see what can be leveraged and what can be scaled."

- SATTS Grant Team Member

POS Enrollment and Outcomes

This section presents descriptive results on POS enrollment. Student enrollment POS, career cluster, award level and CBE Tier is described and also disaggregated according to demographics and other student characteristics. In addition, student educational and employment outcomes are presented according to career cluster, award level, and CBE Tier, again broken out by selected demographics and other student characteristics. These results also provide foundational information for the impact study on educational and employment outcomes.

POS Enrollment

The total number of unique participants over the 4-year period of the grant was 1,114, a statistic that is also presented in the final performance report. Students included in this count met the definition of a unique participant enrolled in a grant-funded POS and/or grant-funded strategy. This number surpassed the target number of participants set in the SOW of 1,054 by 60 participants, or approximately 6%.

Table 6

Demographics & Background Characteristics	Total Number Unique Grant Participants	Percentage of Total Unique Grant Participants
Sex	· ·	
Female	363	32.6%
Male	751	67.4%
Race/Ethnicity		
African American	41	3.7%
Asian	63	5.7%
White	693	62.2%
Hispanic/Latino	279	25.0%
Native American	16	1.4%
Pacific Islander	13	1.2%
More than 1 race	9	.8%
Incumbent workers	709	63.6%
Pell grant recipient	108	9.7%
Eligible veterans	24	2.2%
TAA eligible	9	.8%
Total Unique Participants	1114	100.0%

Distribution of Unique Grant Participants on Demographics and Other Characteristics (n=1,114)

When enrolling in SLCC, all unique participants indicated their goals for enrolling in a POS, with one group of students indicating at the time of their enrollment that they intended to complete a POS and the other group indicating that their intention was to take a course or two but not to complete a POS. Because of the primary focus of the TPE to assess outcomes and estimate impact for students who enroll in POS with the intention to complete, this report focuses on participants who declared their intention to complete a POS. This smaller sample represents 730 unique participants (66%) of the 1,114 total unique participants included in the final grant performance report.

Table 7 compares the distribution of the total unique participants to the evaluation sample on selected demographic characteristics, showing that the two distributions are similar except on a few variables: incumbent workers, and Pell grant recipients. These results show more incumbent workers in the unique grant participant group than the evaluation sample. In contrast, the evaluation sample includes more Pell-grant eligible and eligible workers than the unique participant group. It is noteworthy that representation by Hispanic/Latino students exceeds the campus enrollment of this group, with nearly 24% of the group represented in the evaluation sample compared to 17% on the campus. Other racial/minority groups (e.g., African American, Asian, Native American) were also more highly represented in the evaluation sample, though not to a modest extent compared to the Hispanic/Latino group. Moreover, the enrollment of White students was 62% of the evaluation sample compared to 68% of the overall campus (National Center for Education Statistics, n.d.).

Table 7

Demographic & Background Characteristics	Unique Gran (n=1	nt Participants 1,114)	Evaluation Sample (n=730)		
Characteristics	Number Participants	Percentage of Participants	Number in Evaluation Sample	Percentage of Evaluation Sample	
Sex					
Female	363	32.6%	256	35.1%	
Male	751	67.4%	474	64.9%	
Race/Ethnicity					
African American	41	3.7%	26	3.6%	
Asian	63	5.7%	44	6.0%	
White	693	62.2%	451	61.8%	
Hispanic/Latino	279	25.0%	173	23.7%	
Native American	16	1.4%	14	1.9%	
Pacific Islander	13	1.2%	10	1.4%	
More than 1 race	9	0.8%	8	1.1%	
Incumbent workers	709	63.6%	396	54.2%	
Pell grant recipient	108	9.7%	160	21.9%	
TAA recipient	9	0.8%	9	1.2%	
Total	1114	100.0%	730	100.0%	

Comparison of the Distributions of Unique Grant Participants and Evaluation Sample on Demographics and Other Characteristics

Note: Results of the TAACCCT Round 4 final performance report on unique grant participants, along with the final grant data set, were provided to the TPE team on August 31, 2018, and this data set was used to complete this report. Due to a sizeable discrepancy in the eligible veterans count between the unique grant participants and the evaluation sample that could not be resolved before the evaluation completion data of September 31, 2018, the eligible veterans variable was dropped from the TPE to avoid reporting erroneous results. No serious discrepancies were seen in any other variables, thus the remainder of the report includes all other variables designated in the logic model.

Table 8 shows the distribution of the evaluation sample on other demographic characteristics, including age, first-time college student status, previously enrolled in college status, and remedial course-taker status. The results suggest slightly half of the evaluation sample was first-time college students but only a relatively small percentage was required to take remedial courses reflecting the fact that some POS funded by the TAACCCT grant had modest to no minimum math or English requirements due to their short-term, non-credit status.

Table 8

Demographic & Background Characteristics	Number in Sample Evaluation	Percentage of Evaluation Sample
Age	· · · ·	
Less than 21	36	4.9%
21-25	133	18.2%
26-30	142	19.5%
31-40	189	25.9%
41-50	129	17.7%
Greater than 50	101	13.8%
Average Age		35.6
First-time college student	382	52.3%
Previously enrolled in college	348	47.7%
Remedial course-taker	90	13.3%

Distribution of Evaluation Sample on Demographics and Other Characteristics (n=730)

Table 9 shows the number and percentage of the evaluation sample by the grant-funded POS in which they enrolled. This table and figure 4 displays the distribution of the evaluation sample according to their assignment to the career clusters, with three career clusters (Administrative Office, HIS, Medical Coding, and Accounting Clerk; Computer Support and three Network POS; and Automation & Instrumentation Tech, Electronics Tech, and Truck Driving) making up over two-thirds of the evaluation sample.

Table 9

Number and Percentage of Evaluation Sample by Grant-Funded POS (n=730)

POS by Career Cluster	Number of Evaluation Sample	Percentage of Evaluation Sample
Cluster 1: Admin Office Specialist etc.		
Admin Office Specialist	18	2.4%
Accounting Clerk	52	7.1%
Health Information Specialist	12	1.6%
Medical Coding & Billing	106	14.5%
Cluster 1 Total	188	25.8%

POS by Career Cluster	Number of Evaluation Sample	Percentage of Evaluation Sample
Cluster 2: Computer Support Specialist e	etc.	
Comp Support Specialist	122	16.7%
Network Administration	7	1.0%
Network Infrastructure Tech	4	0.5%
Network Engineering Tech	13	1.8%
Cluster 2 Total	146	20.0%
Cluster 3: Clinical Lab Assistant etc.		
Clinical Lab Assistant	12	1.6%
Clinical Medical Assistant	20	2.7%
Certified Nursing Assistant	27	3.7%
Medical Office Admin	13	1.8%
Cluster 3 Total	72	9.9%
Cluster 4: Electronics Tech etc.		
Automation & Instrumentation Tech	17	2.3%
Electronics Engineering Tech	13	1.8%
Electronics Tech	17	2.3%
Professional Truck Driving	120	16.4%
Cluster 4 Total	167	22.9%
Cluster 5: Graphic Designer etc.	·	
Graphic Designer/Tech	19	2.6%
Media Design Tech	4	0.5%
Website Programmer	28	3.8%
Website Design	15	2.1%
Cluster 5 Total	66	9.0%
Cluster 6: Welding etc.	·	
Air Conditioning/Heating/Refrig	0	0.0%
Diesel Service Tech	1	0.1%
Manual Machinist	29	4.0%
Welding	61	8.4%
Cluster 6 Total	91	12.5%
Grant Total	730	100.0%

Figure 4 displays the distribution of student enrollment by the six career clusters, showing three career clusters make up about 70% of the enrollment. These three career clusters are Cluster 1 labeled

Administrative Office Specialist etc., Cluster 2 offering Computer Support Specialist etc., and Cluster 4 offering Electronics Technician etc.



Figure 4. Distribution of the evaluation sample on the career clusters (n=730).

Table 10 shows the distribution of the evaluation sample enrolled in the career clusters by demographics (i.e., percentage female and students of color (representing all students other than those classified as White), average age, and percentage incumbent workers and Pell-grant eligible). These descriptive results show demographics varied substantially by career cluster, with career cluster 1 and 3 showing a higher percentage of females than the other clusters. Also, very small percentages of students were female in career clusters 4 and 6. These overall results suggest the sex of the students was associated with career clusters, with clusters having occupations considered traditional female or male enrolling the evaluation sample in a similar pattern.

Also, career clusters 1 and 3 showed a higher percentage of students of color than the other clusters, Some variation in the percentage of incumbent worker status and Pell grant recipient was found, with cluster 3 having the highest percentage of students of color and cluster 5 the lowest. Incumbent worker and Pell grant status showed some differences by career cluster as well, with career cluster 4 showing a lower percentage of students who were incumbent workers and Pell grant recipients. Moreover, career cluster 4 also showed a higher average age than the other clusters at 39.2 years of age. The career cluster with the youngest age was cluster 6 at 31.7 years of age.

Career Cluster	Number of Evaluation Sample (n=730)	Percent Female (n=363)	Percent Students of Color (n=275)	Percent Incumbent Workers (n=396)	Pell Grant Recipient (n=160)	Average Age (n=730)
1: Administrative Office Spec etc.	188	63%	42%	60%	32%	37.5
2: Computer Support Spec etc.	146	20%	36%	62%	22%	33.2
3: Clinical Lab Asst. etc.	72	90%	53%	53%	22%	32.5
4: Electronics Technician etc.	167	8%	35%	46%	5%	39.2
5: Graphic Designer etc.	66	32%	30%	52%	30%	34.5
6: Welding etc.	91	8%	34%	48%	24%	31.7

Career Cluster by Demographics of the Evaluation Sample

Similar to the format of Table 10, Table 11 shows results for the evaluation sample on the three award levels. The table shows the number of students who were enrolled in the three award levels, and the percentage of female, students of color, incumbent workers and Pell grant recipient for each award level. The table also shows the average age of all evaluation sample students by award level. These descriptive results show considerable variation by award level and demographics for the evaluation sample. The award level with the highest percentage of female students was the CP, and the CP award level also had the highest percentage of incumbent workers. Students of color were represented in the highest percentage in the CC award, and this group also had the highest percentage of Pell grant recipients. The award level with the highest average age was the CA.

Table 11

Award Level by Selected Demographics of the Evaluation Sample (n=730)

Award Level	Number of Evaluation Sample (n=730)	Percent Female (n=363)	Percent Students of Color (n=275)	Percent Incumbent Workers (n=396)	Pell Grant Recipient (n=160)	Average Age (n=730)
Certificate of Achievement (CA)	219	30%	36%	48%	1%	37.5
Certificate of Proficiency (CP)	396	41%	38%	60%	29%	35.7
Certificate of Completion (CC)	115	23%	41%	46%	37%	31.6

Table 12 shows enrollment of the evaluation sample on the CBE tiers. The table shows the CBE tier by the number of students associated with each tier at the time of their enrollment. These results show a higher percentage of females enrolled in Tier 3 and especially in Tier 4 than other Tiers. These two tiers also show a slightly higher percentage enrollment of students of color than other Tier levels. The average age varied from 33.1 for Tier 3 to 40.4 for Tier 5. The majority of students in five of the Tiers were incumbent workers, with Tier 5 being the exception. Pell grant recipient status varied as well, with the highest percentage of Pell grant recipients being enrolled in Non-CBE. Moreover Pell-grant eligibility was lowest (at 0%) for Tier 5 that represented the most extensive conversion to CBE. These findings are logical because the student clock-hour requirement to qualify for a Pell grant is most present in POS in the Non CBE Tier. This finding may reflect the federal requirement to link enrollment status (according to clock hours) to the awarding Pell grants and measuring progress toward completion by monitoring the accumulation of credit as assessed through clock hours. SLCC is participating in the U.S. Department of Education (DoE) experiment on CBE and the awarding of Pell, offering an opportunity to rethink Pell relative to CBE, but this experiment was not started until near the end of the TAACCCT grant period due to delays in start-up by DoE. Consequently, student enrollment with Pell grants remained relatively low through the grant, due in large part to the lack of direction from DoE on how to proceed to award Pell in the CBE context.

Table 12

CBE Tier at Enrollment	Number of Evaluation Sample (n=730	Percent Female (n=363)	Percent Students of Color (n=275)	Percent Incumbent Workers (n=396)	Pell Grant Recipient (n=160)	Average Age (n=730)
Not CBE	105	23%	34%	52%	41%	37.7
Tier 1	115	18%	37%	60%	23%	36.5
Tier 2	113	28%	38%	50%	26%	36.1

CBE Tier at Enrollment by Selected Demographics of the Evaluation Sample (n=730)

Tier 3	270	43%	42%	57%	16%	33.1
Tier 4	67	88%	43%	58%	28%	35.2
Tier 5	60	8%	25%	37%	0%	40.4

CBE Treatment (Tier 3-5)

Note: This Tier designation was made within the SATTS based on internal understanding of CBE implementation. The TPE interviewed many SATTS employees and reviewed curriculum materials and documentation to verify CBE implementation over the course of the grant, but because of the large curriculum conversion to CBE, it was not possible to verify CBE conversion for all POS. The TPE can confirm, however, that at least two POS (50%) were reviewed for each career cluster.

Educational Outcomes

The number of evaluation sample students who completed a POS during the grant was 263, representing 36% of the sample. However, this finding may under-represent actual program completion since 10 of the 24 POS funded by the grant did not enroll students until the 2017-18 academic year, and many POS required one or more years of clock hour equivalency in order for students to complete the program and receive an award. In fact, results show that 110 (15% of 730) students were enrolled at the time data collection ended on June 30, 2018. By removing these students from the denominator, the adjusted completion rate rose to 42.4%, which reflects an improved program completion rate for SATTS. Knowing many students are incumbent workers and attending on part-time, using the adjusted completion rate seems logical and relevant to measuring the program completion outcome.



Figure 5. Comparison of the program completion rate and adjusted program completion rate (n=730)

Figure 6 shows completion rates for five sub-groups identified as important to the grant. These results show comparable results for the female and students of color sub-groups as compared to the overall completion rate of the total evaluation sample. The completion rate of incumbent workers, representing an important target group of adult learners for this grant, was slightly higher (38%) than the total evaluation sample. Other sub-groups, first time college students and Pell grant recipients, showed substantially higher completion rates than the total evaluation sample, at 44% and 47%, respectively. These descriptive results show grant target groups were completing POS at a similar or higher rate than the overall evaluation sample. Two other target groups, eligible veterans and TAA recipients, were not included in this analysis due to missing and spurious data found in the file transmitted to the TPE.



Figure 6. Completion rates for evaluation sample sub-groups.

Table 13 shows enrollment as well as the completion rates of the evaluation sample for all grant-funded POS. Results show POS completion rates varied widely, from 0% for five POS (Air Cond/Heat/Refrig Technician, Automation & Instrumentation Technician, Diesel Maintenance Technician, Network Administration, and Network Infrastructure Technician) to rates of 50% or higher for six POS: Professional Truck Driving (74%), Clinical Medical Assisting (70%), Clinical Nursing Assistant (63), Electronics Technician (53%), and Media Design Technican and Health Information Specialist (50%).

Table 13

Number and Percentage of Evaluation Sample Participants and Completers by POS (n=730)

Program of Study (POS)	Number of Evaluation Sample Participants	Number of Completers	Percentage Completion
Accounting Clerk	52	21	40.4%
Administrative Office Specialist	18	8	44.4%
Air Cond/Heat/Refr Technician	0	0	0.0%
Auto & Instrument Technician	17	0	0.0%
Certified Nursing Assistant	27	17	63.0%
Clinical Lab Assistant	12	4	33.3%
Clinical Medical Assisting	20	14	70.0%
Computer Support Specialist	122	24	19.7%
Electronics Engineering Technician	13	2	15.4%

Program of Study (POS)	Number of Evaluation Sample Participants	Number of Completers	Percentage Completion
Electronics Technician	17	9	52.9%
Graphic Designer/ Technician	19	8	42.1%
Health Information Specialist	12	6	50.0%
Diesel Maintenance Technician	1	0	0.0%
Manual Machinist	29	3	10.3%
Media Design Technician	4	2	50.0%
Medical Coding and Billing	106	24	22.6%
Medical Office Admin	13	6	46.2%
Network Administrator	7	0	0.0%
Network Engineering Technician	13	0	0.0%
Network Infrastructure Technician	4	1	25.0%
Professional Truck Driving	120	89	74.2%
Web Programmer	28	5	17.9%
Web Site Designer	15	6	40.0%
Welding	61	14	23.0%
Total	730	263	36.0%

Figure 7 shows the number of evaluation sample participants and completers by career cluster, revealing completion rates varied by cluster from 13% to 60%. Career Clusters with the highest completion rates were the Cluster 3 offering primarily healthcare-related POS (clinical lab assisting and CNA, for example) and Cluster 4 offering an array of electronics-related POS as well as profession and truck driving, with completion rates of 57% and 60%, respectively, for these two clusters. By comparison, Cluster 1 offering various administrative POS in healthcare, Cluster 2 offering computer and network-related POSs, and Cluster 6 offering various trade- and skill-related POSs, such as welding and manual machining, showed lower completion rates of 13%, 17% and 19%, respectively. Thirty-two percent (32%) of students in Cluster 5 offering POS in graphics design and web-related occupations completed their POS, putting this in the middle of the overall group of clusters group.



Figure 7. Number of participants completing POS in the six career clusters (n=730 enrollees, n=263 completers).

Figure 8 shows completion rates by award level, with the shortest award, the Certificate of Achievement (CA), having the highest completion rate of 55%. The completion rate for the Certificate of Completion (CC) and Certificate of Proficiency (CP) was identical at 28%. It is noteworthy that the CP award level accounts for half of the POS and also approximately half the participants in the study, thus results for this award level had a major influence on lowering the overall completion rate of 36%.



Figure 8. Number of participants and program completers by award level (n=263).

Figure 9 shows the characteristics by completers by CBE Tier level, noting that Tiers 3-5 are ones that the SATTS considers implementing CBE at a level that students are experiencing the reform. The preponderance of the enrollees are participating in POS at Tier 3 that has a completion rate of only 21%. The completion rate for Tier 4 is even lower, at only 10%, but the completion rate for Tier 5 is much higher at 63%. It is also important to note that the completion rate for the other CBE Tiers, specifically the Non-CBE and Tier 1 including curriculum that is not yet converted to CBE, has relatively high completion rates at 59% respectively. By comparison, the completion rate for Tier 2 that also not begun CBE conversion is 28%.

We speculate that the reasons for the lower completion rates for Tiers 2, 3 and 4 may have several explanations but none can be tested empirically in this grant. For example, some faculty claim that their students are in such high demand that they regularly leave before receiving a college award, particularly if they enroll in a POS that offers industry-recognized credentials that the students have received. Another explanation may relate to challenges that students experienced when the curriculum was being reformed. These challenges were documented qualitative interviews and faculty survey data gathered by the TPE, with some faculty expressing concern at the mid-point of the grant that their students were finding CBE more difficult to navigate than traditional curriculum. These concerns had to do with students regulating their own self-paced learning and finding adequate time to secure tutoring and supports. The scope of these concerns is unknown; however, by the conclusion of the grant, the TPE observed more acceptance of the CBE approach among faculty. The TPE conducted interviews where students offered positive comments about their learning experience and also observed classrooms where students were actively engaged.



Figure 9. Number of participants and program completers by CBE Tier (n=263).

One last aspect of the educational experience that we want to mention and relate to educational outcomes is a strategy linked to CBE, which was acceleration. This notion of acceleration was computed by comparing the time for completion of the POS during the grant to the expected clock hours to complete the POS prior to the grant. The results show acceleration was happening for a majority of the program completers during the grant. Specifically, acceleration was occurring for the majority of completers, with nearly 60% of them demonstrating accelerated completion status (see Figure 10). Over 80% of the program completers completed at a pace that was accelerated or on-time based on their completion time compared to clock hour designation prior to conversion to CBE.



Accelerated Completion On-schedule Completion Slower Completion



Employment Outcomes

Table 14 shows the number and percentage of the total group of program completers and the group of program completers who were considered non-incumbent because they were not working at the time they entered training. This table also shows completion rates for these two groups on the three award levels of CA, CP and CC. Results show 57% of the program completers were employed after completing their POS and the completion rates varied considerably by award level. Students who completed POS offering the CA were less likely to be employed post-training than students who completed POS offering the CP and CC.

Table 14 also presents results for non-incumbent program completers, referring to program completers who were not employed at the time they enrolled in a grant-funded POS. Results show a similar pattern for the group of non-incumbent program completers as the total group of program completers in that the employment rate for students enrolled in POS offering the CA was lower than for POS offering the CP and CC. What is also important to note is that the completion rate for all three award levels was considerably lower (ranging from 23% to 26%) for the non-incumbent program completion group than the total program completion group.

Program Completers by Award	Number of Program Completers	Number Employed Post-Training	Percent Employed Post-Training
Total Program Completers	263	150	57%
Certificate of Achievement (CA)	121	52	43%
Certificate of Proficiency (CP)	110	75	68%
Certificate of Completion (CC)	32	23	72%
<i>Non-incumbent</i> program completers who were not employed prior to the grant	113	38	34%
Certificate of Achievement (CA)	54	11	20%
Certificate of Proficiency (CP)	46	21	45%
Certificate of Completion (CC)	23	6	46%

Number and Percentage of Total Program Completers and Non-incumbent Program Completers by Award Level

Figure 11 shows the percentage distribution of the two groups of total program completers and nonincumbent program completers on the three award levels of CA, CP, and CC. This graphic representation of the data shows the gap in completion rate for the two groups on the three award levels.



Figure 11. Percentage employment for total program completers and non-incumbent program completers by award level.

Table 15 shows results for the total program completion group, the incumbent program completers, and non-incumbent program completers on the mean quarterly wage in the first-quarter post-training. An interesting pattern emerges in these results in that incumbent and non-incumbent program completers finishing POS offering the shortest awards show the highest mean quarterly wage (and standard

deviation) in the first quarter post-training, and this result is consistent for the two program completion groups. Why the first quarterly wage post-training would be higher for the shortest award than the other lengthier awards is unclear and should be read with caution. It is possible that the relatively small number of program completers included in this analysis will not accurately representative of program completers as the POS mature and continue to be offered by the SATTS over time.

Table 15

Number of Total Program Completers, Incumbent Program Completers, and Non-incumbent Program Completers on the Mean Quarterly Wage in First-Quarter Post-Training

Program Completers	Number Completers	Quarterly Wage in First Quarter Mean (s.d.)
Total Program Completers	261	NA
Program Completers employed in the first quarter post- program completion	130	\$6,829 (5,507)
<i>Incumbent</i> Program Completers employed in the first quarter post-program completion	109	\$7,655 (5,545)
Certificate of Achievement	24	\$8,075 (7,501)
Certificate of Proficiency	48	\$7,295 (4,992)
Certificate of Completion	37	\$7,849 (4,652)
<i>Non-incumbent</i> Program Completers employed in the first quarter post-program completion	21	\$3,436 (3,846)
Certificate of Achievement	3	\$5,734 (6,624)
Certificate of Proficiency	9	\$3,061 (2,817)
Certificate of Completion	9	\$2,853 (3,291)

Impact Study

Propensity Score Matching (PSM) provided a vehicle to examine causal effects of program participation on key outcomes of interest such as program completion, labor market participation, and post-program wages. This quasi-experimental design was carried out in two steps. First, program participants (n=724 due to the elimination of six cases that introduced outliers that skewed results in substantive and problematic ways) were matched to non-program participants using a nonparametric matching model outlined by Ho, Imai, King, and Stuart (2007). Second, logistic and linear regression models analyzed the extent to which the treatment (i.e. program participation) was associated with an increased likelihood of favorable outcomes controlling for student-level characteristics.

Observations were matched based on gender, race, age, educational goals, prior college enrollment, incumbent worker status, and program cluster. The nonparametric matching algorithm successfully matched the complete population of program participants based on the propensity scores of the matched treatment and control units. Figure 12 illustrates that the preponderance of unmatched control units that were dropped from the analysis (n = 1,492) had relatively low propensities of program enrollment compared to the matched sample.



Figure 12. Distribution of propensity scores across matched treatment and control groups.

The matched control group yielded an observably similar population of non-program observations across the seven variables employed in the nonparametric algorithm (Table 19).

Table 16

Student Characteristics	Means Treated	Means Control	SD Control	Mean Difference
Gender: Female	0.35	0.33	0.47	0.02
Gender: Male	0.65	0.67	0.47	-0.02
Race: Asian	0.06	0.06	0.24	0.00
Race: Caucasian	0.62	0.64	0.48	-0.02
Race: Hispanic/Latino	0.24	0.21	0.41	0.02
Race: More than one race	0.01	0.01	0.08	0.00
Race: Native American	0.02	0.02	0.14	0.00
Race: Not Disclosed	0.01	0.01	0.09	0.00
Race: Pacific Islander	0.01	0.02	0.13	0.00
Age (in Years)	35.44	36.90	11.35	-1.47
Ed Goal: Industry Cert	0.02	0.01	0.10	0.01
Ed Goal: Institutional Cert	0.85	0.87	0.33	-0.02
Ed Goal: More Knowledge	0.12	0.11	0.31	0.02
Previous College	0.48	0.40	0.49	0.08
Incumbent Worker Status: Yes	0.54	0.54	0.50	0.00
Career Cluster: 1	0.26	0.27	0.45	-0.02
Career Cluster: 2	0.20	0.20	0.40	0.00
Career Cluster: 3	0.10	0.10	0.30	0.00
Career Cluster: 4	0.23	0.22	0.41	0.01
Career Cluster: 5	0.09	0.08	0.28	0.01
Career Cluster: 6	0.12	0.12	0.33	0.00

Characteristics of Treated (n=724) and Control (n=724) Groups

For the second step in this study's QED, an outcome of interest was regressed on the treatment variable (program participation) and a set of student-level covariates across observations in the matched sample (n=1,448). Each regression model contained categorical variables for race (reference category: White/Caucasian), a program's CBE level (reference: Level 1), and award type (reference: Certificate of Achievement). Dichotomous variables included gender and incumbent worker status. A student's age is captured in years.

Turning first to program completion (Table 17), the results suggest that TAACCCT program enrollment increased the odds of program completion by 44.7% over the baseline odds.¹ Noteworthy, however, is that both CBE level (relative to Level 1) and award level (relative to attainment of a Certificate of Achievement) is associated with a negative likelihood of program completion. For CBE level this negative effect on the baseline odds ranges from a decreased odds of program completion by 70% to 95% for Level 2 and Level 4, respectively.

A relationship between favorable post-program employment and program enrollment was not apparent in the analysis (Table 18). Post-program employment was gauged as either employment in the quarter immediately following program completion, or employment during any quarter two years out from program completion. In this model examining employment outcomes the CBE levels again signal a negative effect on the likelihood of employment whereas the award level is statistically insignificant; award level, on the other hand, has a positive effect relative to the odds of employment. Intuitively, an individual's status as an incumbent worker substantially increases the odds of post-program employment.

Table 17

Student Characteristics	Program Completion		
Treature and (Dreature Francillan and)	0.270 [*] (0.201)		
Treatment (Program Enrollment)	0.370	(0.201)	
Gender: Male	-0.545	(0.130)	
Race: African American	-0.035	(0.316)	
Race: Asian	0.036	(0.245)	
Race: Hispanic/Latino	0.232	(0.144)	
Race: More Than One Race	-0.606	(0.661)	
Race: Native American	-0.265	(0.408)	
Race: Not Disclosed	-0.038	(0.690)	
Race: Pacific Islander	-0.667	(0.485)	
Age (in years)	0.005	(0.005)	
Incumbent Worker Status: Yes	0.096	(0.117)	
CBE Level 2 at Program Start	-1.246***	(0.283)	
CBE Level 3 at Program Start	-1.862***	(0.248)	
CBE Level 4 at Program Start	-3.017***	(0.456)	
CBE Level 5 at Program Start	-0.333	(0.364)	
Not CBE or no info available	-0.086	(0.253)	
Award: Certificate of Completion	-1.030****	(0.231)	
Award: Certificate of Proficiency	-0.699***	(0.211)	
Award: Taking Individual Classes	-1.230****	(0.332)	
Constant	0.845^{**}	(0.376)	
Observations	1,448	3	
Note:	*p<0.1; **p<0.0)5; ****p<0.01	

Program Completion Outcome

¹ To facilitate interpretation, the logits will be explained as exponentials of the coefficients i.e. odds ratios.

Post-Program Employment Outcomes

Employment in First Quarter Post-Completion (coefficient and s.e.)		Employment in Any Quarter Post-Completion (coefficient and s.e.)		
Treatment (Program Enrollment)	0.237	(0.213)	0.253	(0.212)
Gender: Male	0.039	(0.137)	0.144	(0.135)
Race: African American	-0.287	(0.341)	-0.287	(0.337)
Race: Asian	0.281	(0.262)	0.162	(0.261)
Race: Hispanic/Latino	0.018	(0.150)	-0.091	(0.148)
Race: More Than One Race	-0.290	(0.677)	-0.033	(0.612)
Race: Native American	-0.711	(0.464)	-0.216	(0.430)
Race: Not Disclosed	-1.853**	(0.834)	-2.251***	(0.832)
Race: Pacific Islander	-0.285	(0.494)	-0.673	(0.491)
Age (in years)	-0.005	(0.005)	-0.005	(0.005)
Incumbent Worker Status: Yes	1.970^{***}	(0.128)	1.733***	(0.124)
CBE Level 2 at Program Start	-0.294	(0.294)	-0.616**	(0.292)
CBE Level 3 at Program Start	-1.116***	(0.256)	-1.392***	(0.256)
CBE Level 4 at Program Start	-1.221***	(0.370)	-1.719***	(0.369)
CBE Level 5 at Program Start	-1.297***	(0.477)	-2.005***	(0.469)
Not CBE or no info available	0.076	(0.273)	-0.031	(0.274)
Award: Certificate of Completion	0.697^{***}	(0.255)	0.467^{*}	(0.243)
Award: Certificate of Proficiency	0.915***	(0.237)	0.818***	(0.225)
Award: Taking Individual Classes	0.316	(0.352)	0.319	(0.343)
Constant	-1.688***	(0.408)	-0.930**	(0.396)
Observations	1,4	148	1,	448
Note:			*p<0.1; **p<0.	.05; ****p<0.01

Finally, program enrollment is associated with a substantial and statistically significant increase in postprogram wages (Table 19). Controlling for the demographic factors included in the model and the CBE level of a student's program, TAACCCT program participation is linked to an average post-program quarterly wage increase of \$674.70. This model also predicts that incumbent workers' quarterly wages are, on average, higher compared to non-incumbent workers to the magnitude of approximately \$550. Examining the highest quarterly wage earned across two years (i.e. eight quarters post-program completion) reveals an even greater premium associated with TAACCCT program enrollment; for this outcome, program enrollment is associated with a higher quarterly wage of \$1,423 compared to the wage earners in the control group.

Table 19

Post-Program Wage Outcomes

	Average Qtr W	Vage Increase	Highest Wage, Q1 to Q8	
	(coefficien	t and s.e.)	(coefficier	it and s.e.)
Treatment (Program Enrollment)	674.70***	(194.95)	1,423.87**	(567.16)
Gender: Male	239.61*	(124.64)	1,543.51***	(362.61)
Race: African American	156.52	(301.10)	-215.32	(875.98)
Race: Asian	-30.76	(234.53)	505.37	(682.31)
Race: Hispanic/Latino	-172.70	(136.40)	-108.01	(396.83)
Race: More Than One Race	-470.89	(586.17)	-1,923.78	(1,705.35)
Race: Native American	-221.52	(395.61)	-1,608.25	(1,150.96)
Race: Not Disclosed	-649.68	(667.71)	-4,346.78**	(1,942.57)
Race: Pacific Islander	-609.79	(442.64)	-754.15	(1,287.78)
Age (in years)	20.27^{***}	(4.84)	34.58**	(14.08)
Incumbent Worker Status: Yes	551.17***	(111.66)	4,786.54***	(324.85)
CBE Level 2 at Program Start	- 657.61 ^{**}	(269.26)	-1,704.91**	(783.35)
CBE Level 3 at Program Start	-1,146.64***	(230.90)	-3,144.07***	(671.77)
CBE Level 4 at Program Start	-1,313.17***	(330.25)	-3,516.95***	(960.81)
CBE Level 5 at Program Start	-1,718.78***	(354.47)	-4,560.10***	(1,031.24)
Not CBE or no info available	160.22	(250.69)	377.20	(729.34)
Award: Certificate of Completion	- 418.68 [*]	(220.43)	-400.18	(641.29)
Award: Certificate of Proficiency	12.94	(202.20)	-23.50	(588.25)
Award: Take Individual Classes	192.55	(315.61)	519.26	(918.22)
Constant	298.37	(361.22)	244.01	(1,050.89)
Observations	1.	,448	1,4-	48
R^2 / Adjusted R^2	0.09	0 / 0.08	0.19 /	0.18
Note:			*p<0.1; **p<	0.05; ***p<0.01

Summary and Lessons Learned

The TAACCCT round 4 grant awarded to Salt Lake Community College (SLCC) had an ambitious focus on improving programs in a range of industry sectors and implementing support services to enhance student outcomes in program completion coupled to credential attainment as well as employment. The overarching goal of the grant was to "transform the School of Applied Technology and Technical Specialties (SATTS) [in SLCC] so that long-term, the SATTS is more open to the larger environment and successful in transitioning students into employment and further education." A number of strategies were funded to help the SATTS achieve this goal, including a primary focus on curriculum development to convert 24 POS to a comprehensive competency-based education (CBE) approach. The following discussion summarizes major findings to the three distinct although integrated components of the evaluation.

Major Findings

Implementation Evaluation. The TAACCCT grant enabled the implementation of improvements in the form of CBE and other student supports to 24 programs of study (POS). Six of the 24 POS offered the Certificate of Completion (CC), representing a long-term certificate, six offered the Certificate of Achievement, representing the shortest term certificate offered under the grant, and 12 POS offered the Certificate of Proficiency (CP), representing awards between the CC and CA levels. POS offering the CP award were most predominant throughout the grant.

CBE conversion was key to this TAACCCT grant, and this curriculum development process varied from one POS to another. Most POS were impacted by the CBE reform in the first two years of the grant but some lagged behind and a few were disconnected due to low enrollment or other challenges with implementation. Ultimately, however, the majority of POS were converted to CBE at the Tier 3 or higher level, meaning 50% or more of the curriculum was converted to CBE at the time students began enrollment in the POS. Students who started in a POS converted to CBE at Tier 3 or higher experienced a substantially reformed CBE curriculum from their first enrollment to their completion of the POS.

Another important aspect of the grant was reform of student services including student recruitment, onboarding, retention, and academic and career advising. Throughout the grant but especially in the last year of the grant, concerted attention was paid to improving student services, including developing new policies and processes directed at student success. Important developments in the area of student supports included improving relationships among campus units, improving marketing and communications with students, and redesigning a wide range of student supports such as onboarding and initial advising.

Efforts were also made to enhance Recognition for Prior Learning (RPL) under the grant in order to positively impact student retention and completion, including making efforts to increase understanding of what RPL means and how students can access and benefit from participating in it. To this end, progress was made on aligning SATTS policy to SLCC policy to ensure that students are able to benefit from RPL. Efforts were also made to enhance career services, including improving student referral to the SLCC Career Center and improving follow-up to non-completers. A number of recommendations were also made in this area, including offering professional development to assist faculty and staff to understand the services provided by the Career Center and improving student tracking post-enrollment.

Employer engagement was another important strategy in the grant, with the SATTS using grant funds to enhance its already extensive Program Advisory Committee (PAC) efforts. Results showed that many employers who participate in the PACs hold positive perceptions of SATTS students, including commenting favorably on students who work for them as interns and/or become full-time employees. Opportunities for further improvement were identified through the grant, including identifying ways to increase participating of more employers to deepen and enhance their support for program improvement through the CBE conversion process.

Also, considerable time and attention was dedicated to data collection using funds from the TAACCCT grant. A student file was created and utilized during years 2-4 of the grant to document student enrollment, program outcomes, credential attainment, and employment. The grant's plan to use funds to increase data collection and use for program improvement and scale evidence-based reforms to other units of SLCC materialized under the grant, and time will tell whether these efforts to use data for continuous improvement will be sustained.

Program Enrollment and Outcomes Evaluation. Enrollment in the grant-funded POS exceeded the target enrollment of the grant set at 1,054 by reaching 1,114 students. The total number of grant participants was reported by the SLCC grant team in the final DoL performance report and represents 60 students (or 6%) more than the target number. Participants in the TAACCCT grant are more highly diverse on race/ethnicity than the general SLCC student population, with nearly 24% of the evaluation sample being Hispanic/Latino compared to 17% in the overall SLCC student body. Other racial/ethnic groups, African American, Asian, and Native American, were more highly represented in the evaluation sample than the campus, though the difference was modest compared to the Hispanic/Latino group. Logically, the White student group represented 62% of the evaluation sample compared to 68% of the overall campus (National Center for Education Statistics, n.d.).

Consistent with SATTS policy, test scores from TABE were used to assess student placement and also made available to the TPE team to measure pre-grant academic performance. Data gathered by the TPE showed only a small percentage of students (13%) placed into remediation based on the TABE test results indicating that most students who enrolled in grant-funded POS were able to enroll without having to address remedial requirements. The distribution of student enrollment by the six Career Clusters designated in the grant revealed three Clusters (Cluster 1 offering Administrative Office Specialist etc., Cluster 2 offering Computer Support Specialist etc., and Cluster 4 offering Electronics Technician etc.) made up about 70% of the total grant enrollment. Descriptive results showed student demographics varied substantially by Cluster, with Clusters 1 and 3 offering administrative and health-care related occupational training showing a higher percentage of females than the other Clusters; Very low percentages of students were female in Clusters 4 and 6 offering electronics and trade-related occupations. These results suggest the sex of students was associated with enrollment in POS and Career Clusters in ways typically considered traditional to their sex (e.g., healthcare for females and trades for males).

The number of evaluation sample students who completed a POS during the grant was 263, representing 36% of the sample. However, this finding may under-represent actual program completion since 10 of the 24 POS funded by the grant did not enroll students until the 2017-18 academic year, and many POS required one or more years of clock hour equivalency in order for students to complete the program and receive an award. In fact, results show that 110 (15% of 730) students were enrolled at the time data collection ended on June 30, 2018. By removing these students from the denominator, the adjusted completion rate rose to 42.4%, which reflects an improved program completion rate for SATTS. Knowing many students are incumbent workers and attending on part-time, using the adjusted completion rate seems logical and relevant to measuring the program completion outcome.

Results also showed POS completion rates varied widely and these varied rates are also reflective in Career Clusters (as reported in the main report). Completion rates for programs range from 0% for five POS (Air Cond/Heat/Refrig Technician, Automation & Instrumentation Technician, Diesel Maintenance Technician, Network Administration, and Network Infrastructure Technician) to 50% or higher for six POS: Professional Truck Driving (74%), Clinical Medical Assisting (70%), Clinical Nursing Assistant (63), Electronics Technician (53%), and Media Design Technican and Health Information Specialist (50%). Moreover, the completion rate for five sub-groups identified as important to the grant was comparable for the female and students of color sub-groups to the overall completion rate of the total evaluation sample. The completion rate of incumbent workers, representing an important target group of adult learners for this grant, was slightly higher (38%) than the total evaluation sample. Other sub-groups,

first time college students and Pell grant recipients, showed substantially higher completion rates than the total evaluation sample, at 44% and 47%, respectively. These descriptive results show grant target groups were completing POS at a similar or higher rate than the overall evaluation sample. Two other target groups, eligible veterans and TAA recipients, were not included in this analysis due to missing and spurious data found in the file transmitted to the TPE.

Results on completion rates by award level show the shortest award, the Certificate of Achievement (CA), had the highest completion rate at 55%. The completion rate for the Certificate of Completion (CC) and Certificate of Proficiency (CP) awards was identical at 28%. It is noteworthy that the CP award level accounts for half of the POS and also approximately half the participants in the evaluation study, thus results for this award level had a major influence on the overall completion rate.

Completion rate by CBE Tier varied as well, with Tiers 3-5 being ones that the SATTS considered implementing CBE at a level that students could experience the reform. The preponderance of enrollees were participating in POS at Tier 3 that showed a completion rate of 21%, well below the overall unadjusted program completion rate of 36%. The completion rate for Tier 4 was even lower, at only 10%, but the completion rate for Tier 5 was much higher at 63%. Moreover, the completion rate for the other CBE Tiers, specifically the Non-CBE and Tier 1 including curriculum that was not yet converted to CBE, was also relatively high at 59%. By comparison, the completion rate for Tier 2 that also had not begun CBE conversion was 28%. Reasons for these varied rates may have to do with the extent to which CBE conversion met with challenges in implementation, the varied enrollment of student populations conducive to completion in a relatively brief amount of time, and other factors.

One last aspect of students' educational experiences relates to a strategy linked to CBE called acceleration. This notion of acceleration was computed by comparing the time for POS completion during the grant to the expected clock hours to POS completion prior to the grant when clock hours dictated progress. Results showed acceleration was occurring for the majority of program completers in the grant, with nearly 60% of them demonstrating accelerated completion. Over 80% of the program completers completed their POS at a pace considered faster than a typical pace (i.e., accelerated pace) or at an on-time pace, based on historical practices.

Results show 57% of the program completers were employed after completing their POS and the completion rates varied considerably by award level. Students who completed POS offering the CA were less likely to be employed post-training than students who completed POS offering the CP and CC. The completion rates for all three award levels were considerably lower (ranging from 23% to 26%) for the non-incumbent program completion group than the total program completion group. These results suggest students who were employed prior to enrolling in grant-funded POS were also much likely to be employed post-training than the total program completion group.

An interesting pattern emerged for incumbent and non-incumbent program completers with respect to wages. These results show finishing a POS offering the shortest award (i.e., CA) shows the highest mean quarterly wage (and standard deviation) in the first quarter post-training. Why the first quarterly wage post-training would be higher for the shortest award than the other lengthier awards is unclear and should be read with caution. It is possible that the relatively small number of program completers included in this analysis will not be representative of program completers as the CBE conversation process proceeds.

Impact Evaluation. QED results suggest that TAACCCT program enrollment increased the odds of program completion by 44.7% over the baseline odds. However, both CBE level (relative to Level 1) and award level (relative to the CA) was associated with a negative likelihood of program completion. For CBE level this negative effect on the baseline odds ranged from a decreased odds of program completion by 70% to 95% for Level 2 and Level 4, respectively.

A relationship between favorable post-program employment and program enrollment was not observed in the analysis. Post-program employment was gauged as either employment in the quarter immediately following program completion, or employment during any quarter two years out from program completion. In this model examining employment outcomes the CBE levels again signaled a negative effect on the likelihood of employment whereas the award level was statistically insignificant; however, award level had a positive effect relative to the odds of employment. Intuitively, an individual's status as an incumbent worker substantially increased the odds of post-program employment.

Finally, program enrollment was associated with a substantial and statistically significant increase in postprogram wages. Controlling for demographic variables and the CBE level of a student's POS, TAACCCT program participation was associated with an average post-program quarterly wage increase of \$674.70. This model also predicted that incumbent workers' quarterly wages were, on average, higher compared to non-incumbent workers to the magnitude of approximately \$550.00. Examining the highest quarterly wage earned across two years (i.e. eight quarters post-program completion) revealed an even greater premium associated with TAACCCT program enrollment; for this outcome, program enrollment was associated with a higher quarterly wage of \$1,423 compared to the wage earners in the control group.

Lessons Learned

The SLCC grant was provided generous resources and momentum to convert a sizeable portion of the SATTS CTE and applied technology curriculum to competency-based education (CBE). Though the process was not easy or quick, administration, faculty, staff and students involved in granted-funded POS experienced substantive outcomes despite having to overcome challenges. CBE is a forward thinking, comprehensive reform strategy that extends to nearly all aspects of a college education and therefore also touches nearly all institutional policies and practices. Engaging in such ambitious reform is necessarily complex and especially demanding in the context of the TAACCCT grant. Even so, stakeholders associated with the grant persevered to change 24 POS and numerous student support strategies designed to increase student success. Chief among these strategies were efforts to improve student recruitment, onboarding, and academic and career advising.

Because the CBE conversion process is so extensive, the SATTS needs more time to implement changes to curriculum and support services. Lessons learned about coordinated communications and coordination within SATTS need to be encouraged and supported throughout SLCC considering that other units are seeking to implement CBE reform. Participatory decision-making processes such as those conducted in year 4 of the grant, including facilitation by the TPE, need to continue to be encouraged and supported so that the interdependent relationships that are required to implement CBE happen consistently and smoothly. To this end, the use of data to track student progress, including the full implementation of an LSM that can provide fine-grained results for students progressing through particular and multiple POS are needed. This evaluation revealed very few students participating in multiple POS but the TPE is uncertain whether this finding accurately depicts student behavior or is an outcome of the particular way data were collected for the grant.

Finally, the SATTS and SLCC personnel are encouraged to continue to implement CBE but also learn from this evaluation to better associate student-level data to CBE implementation. Results of this evaluation provide a mixed assessment of the impact of CBE on student outcomes. Some evidence of increased program completion from POS enrollment emerged from the study, but these positive results were dampened for students who enrolled in some POS converted to CBE. Lessons on how to develop curriculum that is consistently positively impactful is needed. On the other hand, knowing that, on average, POS completers show impressive wage gains upon entering employment post-training is an important finding that suggests further strengthening of the PACs and employer engagement could pay off for the SATTS in terms of wage benefits for students.

Recommendations

A brief set of recommendations is offered to SLCC for consideration.

- 1) Target additional CBE implementation to other POS that have substantial numbers and potential to enable students to progress through their POS to completion and employment.
- 2) Ensure strategies pertaining to CBE implementation and other related reforms are drawing on meaningful data collection and analysis to inform the change process on an on-going basis.
- 3) Ensure that program improvements address the needs of all students, including student subgroups that non-traditional by gender and historically marginalized from college enrollment.
- 4) Enhance connections between SATTS POS, academic and career advising, and the Career Center so that students better understand how these various units and functions can positively influence their pathways moving forward to employment.
- 5) Institutionalize a working LMS system and track student progression through education and into employment, noting courses, modules, competencies and other student learning experiences that influence student success.
- 6) Enhance the articulation and transition of students through career pathways that create opportunities for forward movement from one POS to another so that students can accumulate competencies that have labor-market benefits.

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Appendix A Competency-Based Education @ SLCC

The following document provides a shared vision and set of common guidelines and definitions around the use of CBE within the School of Applied Technology (SAT) at SLCC.

What is Competency-Based Education (CBE)?

CBE Student Benefits

• Reduce Time to Completion

Students who enter the program with extra motivation, affinity to learn the material, or previous knowledge in the subject can accelerate through the program faster.

• Reduce Cost of Attendance

Students who are able to accelerate through the program will pay less in tuition. The fewer calendar days a student takes to complete the program requirements the lower the tuition charged.



• Recognition of Prior Learning

This delivery model recognizes and rewards all

students for the knowledge they bring into their program of study. Learning is measured based on demonstration of competency and not time (credits or clock hours). If a student has previous knowledge of a competency they can demonstrate that by accelerating through the assessment, or they may take additional time working up to an assessment if the competency is new to them.

• Self-Paced, Self-Directed Learning

Using technology-enhanced educational resources, students will participate in an environment that allows them to capitalize on their motivation or other factors that influence their pace of academic achievement. Through this technology enhanced approach, adult students will also realize the ability to customize their approach to learning.

• Flexibility in Delivery

The design of the CBE model provides program entry dates every Monday for incoming students. It is based on a hybrid, or blended, delivery system that uses both online and face-to-face instruction, which allows students to access learning materials and activities that accommodates their schedule and learning preference.

• Industry Designed Transcripts

CBE transcripts will list the competencies mastered and not course names. This is designed to demonstrate to potential employers "what you can do", rather than overarching concepts seen in a typical course title.

CBE Principles

For a consistent and quality student experience across all CBE courses at SLCC, CBE courses should:

- Encompass robust and valid competencies
- Directly align competencies, learning objectives, and assessments (and other instructional activities)
- Offer variable pace learning
- Provide student support and learning resources 24/7
- Include secure and reliable assessments

- Provide authentic assessments tied closely to real world applications
- Include clearly defined levels of proficiency or mastery

Definition of Terms

Competency and Learning Outcome are observable and measurable statements that define the specific skills, knowledge, or abilities demonstrated by a learner. They are often focused at an overarching level rather than a more granular level. Often the terms 'learning outcome' and 'competency' are used interchangeably as they are generally at the same level of granularity. SLCC uses the term learning outcomes in curriculum documents. Sets of learning outcomes can be defined at the level of the institution, program, course, learning module, or in other types of groupings.

Learning Objectives are the measurable goals that direct/guide learning to obtain the competency. Learning objectives are created by unpacking parts of a competency into more focused, discrete elements.

Assessment is the demonstration of competencies and objectives. Educators use a variety of assessment, methods to evaluate measure, and document the academic readiness, learning progress, and skill acquisition of students. Assessment should be authentic - indicating as closely as possible the way in which a competency or objective will be demonstrated in the individual's professional and/or civic life. Formative assessments serve as instructional activities for the course while summative assessments measure proficiency at the end of the course.

Instructional Activities are aligned to the competencies and objectives of the course and provide learners with the necessary skills, knowledge, and experience to prepare for summative assessments. Learners may choose whether or not to complete instructional activities based on their learning needs.

Alignment refers to the coherence among all elements entailed in educating students, including competencies and objectives, assessments, instructional activities, learning resources, and delivery of instruction.

Proficiency and Mastery are terms used to signify levels of achievement. Proficiency and mastery are determined by the academic school based on content, requirements, and associated

accreditation standards. Programs, courses, and outcomes vary in whether they require proficiency or mastery in order for students to demonstrate competence.

Resources:

Clarifying Competency Based Education Terms American Council on Education (ACE) Blackboard



Appendix B ACED Grant Work Plan

ACED Grant Work Plan				
Strategy 1: Develop Competency-based Education Frameworks and Programs				
Milestones	Cost	Implementers*	Timeline	
Activity 1.1: Develop CBE Faculty Support and Traini	ng Services			
Develop CBE training modules			10/14-12/15	
Develop online training modules	\$199,795	PD, PM, AD, Faculty,	1/15-12/15	
Provide CBE environment training for faculty		10.5	Ongoing	
Deliverables				
1. Online training modules available for faculty (peda	gogy, course c	design, technology integra	tion)	
2. Training modules made available for distribution to	WGU Partne	r Schools and C-BEN		
Activity 1.2: Create CBE Development and Implement	ation Standar	ds, Policies and Procedu	res	
Develop CBE design standards	\$20 724	PI, PD, PM, AD,	1/15-8/15	
Develop CBE Policy and Procedure Handbooks	\$09,724	Faculty, ID's, SSS	1/15-8/15	
Deliverables				
1. CBE Program Design Handbook developed, impler	nented and dis	stributed to WGU and C-I	BEN	
2. Policy and Procedure Handbooks developed, imple	mented and di	stributed		
Activity 1.3: Create Prior Learning Assessment System				
Develop list of accepted recognition for prior learning in all proposed programs		PD, PM, AD, Faculty, DA, ID's, SSS	10/14-12/15	
Develop a record-keeping system for verification and award of prior learning	\$103,292		1/15-6/15	
Develop a system for educating students on prior learning recognition options			1/15-12/15	
Deliverables	I			
1. List of accepted recognition for prior learning in all	proposed pro	grams		
2. Website and other marketing materials for students	describing pri	ior learning options		
3. Implement central office (Assessment Center) to ha prior learning	ndle verificat	ion, recording and process	sing of recognition of	
Activity 1.4: Convert 4 SAT Career Clusters (20 progra	ıms) into Con	npetency-based Format		
Transform 4 career clusters (20 programs) into CB				
format:			10/14-2/15	
i. Computer Support Specialist, Network Administrator, and Network Infrastructure			10/17-2/13	
ii Clinical Lab Assistant Clinical Medical			3/15-9/15	
Assistant, and Medical Office Administration	¢047.0((PI, PD, PM,AD,		
iii. Administrative Office Specialist, Health	\$84/,866 Faculty, ID's,			
Information Specialist, and Medical Coding and Billing		Industry	10/15-2/16	
 Electronics Engineering Technician, Electronics Technician, Professional Truck Driving 			3/16-9/16	
v. Graphic Designer, Media Design Technician,				

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Web Programmer, Website Designer vi. Air Conditioning/Heating/ Refrigeration, Heavy Duty Diesel Maintenance Technician, Manual Machinist, and Welding			10/16-2/17	
			3/17-9/17	
Deliverables	•			
1. Offer 20 transformed CB programs (will be offered	the month aft	er the timeframe listed in	1.4)	
2. Purchase simulation equipment for the welding and	truck driving	programs (10/15-3/16)		
Strategy 2: Build Partner Relationships	<i>a</i>			
Milestones	Cost	Implementers*	Timeline	
Activity 2.1: Engage Employers and Industry in Progra	am Design an	d Implementation		
Employers and Industry help identify and map program competencies			10/14-9/17	
Employers and Industry assist with curriculum development and design			10/14-9/17	
Employers and Industry help identify appropriate industry certifications to include in program design	\$265,000	PD, PM, AD, Industry, PA	10/14-9/17	
Employers and industry formally review final developed programs			Activity 1.4 timeline	
Review existing and develop new externships/ apprenticeships			10/14-9/17	
Deliverables				
1. Review and implement employer and industry recommendations into program design				
2. Distribute formal employer/industry reviews to faculty and other stakeholders				
Activity 2.2: Develop enhanced Business Industry Lead	dership Team	s for each project career	cluster	
Create enhanced industry engagement framework (BILTs) for each career cluster	\$89,725	PD, PM, AD, Industry, PA	10/14-8/15	
Deliverables	•			
1. Include new model for industry engagement in the CBE Program Design Handbook				
Activity 2.3: Create Community Partner Roundtables				
Create semi-annual community partner roundtables to discuss CBE model, solicit feedback, and present results	\$10,000	PI, PD, PM, AD, PA, Community Partners, DWS	10/14-9/18	
Deliverables				
1. Hold semi-annual community partner roundtables				
2. Implement roundtable feedback into model or progr	ram design			
Activity 2.4: Third-Party Evaluation				
Design and properly implement the proposed quasi- experimental research design			10/14 - 2/15	
Develop secure data transfer infrastructure			10/14 -12/14	
Develop and implement customized evaluation tools to examine program and strategy implementation on an annual basis	\$175,400	Evaluators, DA	10/14-3/15	
Conduct baseline implementation assessment and			Baseline 11/14-	

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follow-up implementation assessment on annual basis			4/15; Annual assessments, 3/16, 3/17, 3/18
Analyze participant progress and outcome measures and use appropriate methodology to examine individual strategy contributions to such outcomes			Ongoing
Using implementation annual results, provide recommendations for developing appropriate Continuous Improvement Processes			5/15, 5/16, 5/17, and 5/18
Deliverables			
1. Baseline Grant Evaluation Progress Report			
2. Mid-Grant Evaluation Progress Report			
3. Final Evaluation Report			
Strategy 3: Develop Systems to Support the Con	npetency-ba	ised Format and Pron	note Student
Milestones	Cost	Implementers*	Timeline
Activity 3.1: Develop Marketing Campaign to Educate CBE Model	Internal and	External Audiences on t	the Benefits of the
Create list of CBE terms and definitions	\$112.202	PD, PM, SLCC	10/14-2/15
Develop messaging campaign	S113,292 Marketing, DWS	10/14-2/15	
Deliverables			
1. Include list of terms and definitions in the CBE Pro	gram Design	Handbook	
2. Messaging campaign to promote Utah ACED/CBE	programs (3/1	15-9/17)	
Activity 3.2: Develop Student Support Infrastructure			
Creation of SAT intake system			10/14-7/15
Creation of online orientation system	\$89,725	PI, PD, PM,PA,SSS,	1/15-7/15
Develop strategies and systems to support student retention, completion and employment	<i>~~~,·</i>	DWS	10/14-12/15
Deliverables			
1. Implement and distribution of new intake system			
2. Implement of orientation system			
3. Implement strategies and systems to support studen	t retention, co	mpletion and employmer	nt
Activity 3.3: Develop Data Systems	1	I	
Create new IT systems to support the collection, tracking and reporting of data not currently captured by existing systems		PD. PM. DO. SSS.	10/14-7/15
Create project participant forms to complement new data systems	\$282,300	IR, IT, DWS, Evaluators	1/15-7/15
Align new IT systems with DWS data collection and reporting			10/14-7/15
Deliverables			
1. Testing and implementation of new data collection,	tracking and	reporting system	
2. Implement new project participant forms			
3. Collect labor market and employment data from DWS			
Activity 3.4: Articulate Ten Clock-hour CBE Programs	s to Credit As	sociate Degree Offerings	s at SLCC

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Develop articulation agreements for ten programs		PI, PD, PM, AD,	3/15-2/18	
Develop messaging campaign for new articulation agreements	\$233,881	Faculty, Other SLCC departments	3/18-9/18	
Deliverables				
1. Formalization of articulation pathways for 10 clock-hour CBE certificates to SLCC Associate degrees				
2. Promote new articulation pathways to current and f	uture students			
*PI=Senior Project Director/Principle Investigator, PD= Dean, PA=Project Associate, DO=Director of Operation Research, IT=SLCC Information Technology	Project Direct ns, DA=Direct	tor, PM=Program Manage tor of Assessment, IR=SL	er, AD=Associate CC Institutional	