TRAMCON Consortium Final Evaluation Report

Training for Manufactured Construction Consortium TAACCCT Round 4

Submitted to:
U.S. Department of Labor:
Employment & Training
Administration

Submitted by:
Thomas P. Miller & Associates

September 2018

ACKNOWLEDGEMENTS

Thank You

To the leadership of Miami Dade College, Polk State College, Santa Fe College, and Seminole State College for your support an active engagement in the TRAMCON program.

To the faculty and staff of the consortium colleges for your hard work in implementing the TRAMCON program and your valuable insights about the program.

To the employers, community partners, and participants who met with the Evaluation Team and provided feedback about the program throughout the implementation.

To the U.S. Department of Labor for funding this program and evaluation.

The Evaluation Report

This final evaluation report was developed by Thomas P. Miller & Associates, LLC. Evaluation report contributors included:

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SF SANTA FE COLLEGE

POLK STATE COLLEGE

SEMINOLE STATE COLLEGE OF FLORIDA

EXECUTIVE SUMMARY

Program Overview

The TRAMCON program was implemented by a consortium of colleges in Florida, including Miami Dade College, Polk State College, Santa Fe College, and Seminole State College. The TRAMCON program sought to increase job placements for program participants by training them for careers in the manufactured construction industry. Consortium partners begin developing the TRAMCON curriculum in 2014, and grant staff began implementing the program during Year 1 of the grant. The program was designed to be free for students, with the exception of costs related to fees for the assessments required to earn industry recognized credentials.

TRAMCON Intervention Components

The TRAMCON program pathway was developed in four coursework levels:

1. Foundation
2. Basic
3. Advanced
4. Supervisor.

Along the pathway, participants had the opportunity to earn credentials from both the construction and manufacturing sectors after the completion of each level of the program. The program provided a multi-entry, multi-level stacked and latticed credentialing system, and included on-the-job (OJT) training.

Grant staff utilized existing college resources, local CareerSource offices, the Retention, Recruitment and Completion Coaches (Coaches), and other grant staff to provide support to TRAMCON students. Grant staff also assisted students with job placement supports, including resume development supports, mock interviews, and employability trainings, through local CareerSource staff and Job Developers hired through the grant.
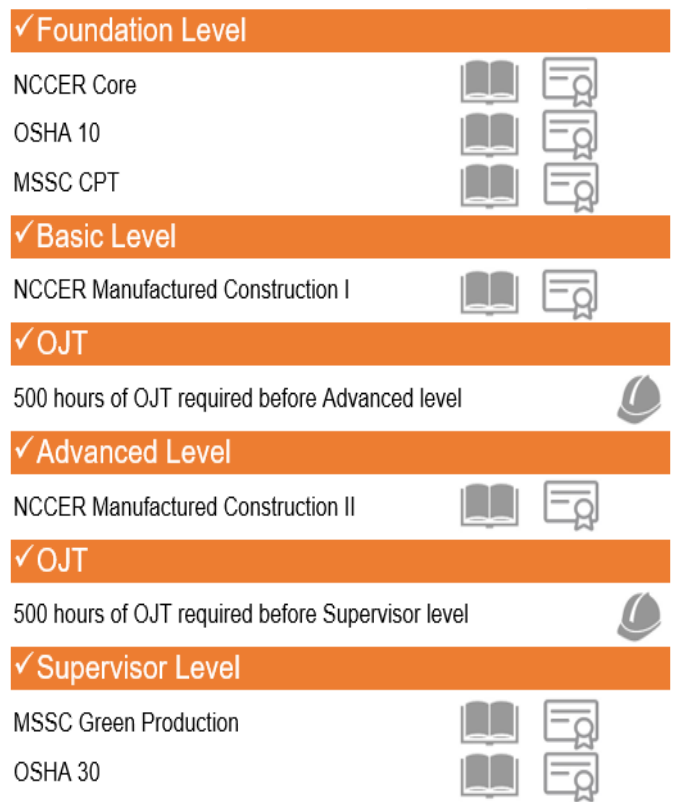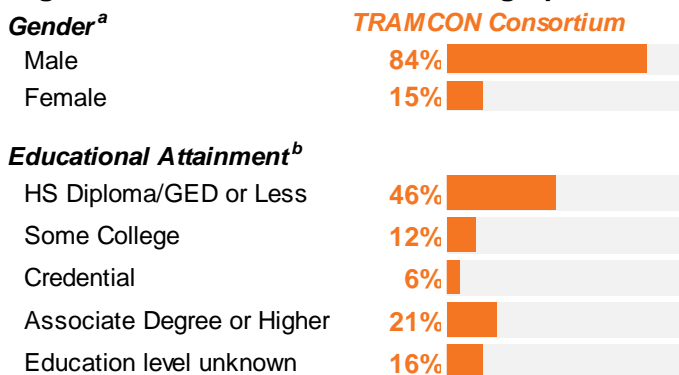
Figure i. TRAMCON Pathway as

Figure ii. TRAMCON Student Demographics

Student Population Served

Across the consortium, the TRAMCON program served students tended to be male, and most students had a high school diploma/GED or less education. Additionally, three of the four consortium colleges served incarcerated populations during the grant period.

[a] Missing includes Other category, as the number of students for this category was very small (n=2)
[b] Missing includes students who are currently attending school, so their highest level of education was not known

Evaluation Design

Thomas P. Miller & Associates, LLC (TPMA) served as the independent, third-party evaluator for the TRAMCON program. The evaluation's primary purpose was to assess the planning, implementation, and effectiveness of the intervention. The evaluation itself consisted of two components, implementation and outcomes studies.

Implementation Evaluation Design

The Implementation Evaluation began January 2015 and continued through May 2018 to document program progress, monitor program outcomes, and provide recommendations for continuous improvement of program operations. The Implementation Evaluation focused on a series of research questions to explore the development and implementation of the TRAMCON program, employing principles of a utilization-focused framework.[1] This evaluation was primarily qualitative and used a general inductive thematic approach[2] to analyze the data including program update calls, interviews and focus groups, and document review.

Table i. Implementation Evaluation Research Questions

Implementation Evaluation Research Questions
How was the particular curriculum selected, used, and/or created?
How were programs and program designs improved using grant funds? What delivery methods were offered? What was the program administrative structure? What support services and other services were offered?
How were assessment tools used to select participants for the grant program? Was an in-depth assessment of participants' abilities, skills, and interests conducted to select participants into the grant program? What assessment tools and processes were used? Who conducted the assessment? How were the assessment results used? Were the assessment results useful in determining the appropriate program and course sequence for participants? Was career guidance provided, and if so, through what methods?
What contributions did each of the partners (i.e., employers, workforce system, other training providers and educators, philanthropic organizations, and others as applicable) make in terms of: (1) program design, (2) curriculum development, (3) recruitment, (4) training, (5) placement, (6) program management, (7) leveraging of resources, and (8) commitment to program sustainability? What factors contributed to partners' involvement or lack of involvement in the program? Which contributions from partners were most critical to the success of the grant program? Which contributions had less of an impact?
What program outputs have been generated to date? What barriers hindered output achievement? What factors unexpectedly improved output achievement? Why?
How satisfied were program partners, staff, and participants with the program? Why?
What have been the successes and obstacles to program performance?
How can program processes, tools, and/or systems be modified to improve performance?
How can the program expand or enhance institutional capacity? What are the most promising programmatic components to use institution-wide? Why?

Outcomes Evaluation Design

The purpose of the Outcomes Evaluation was to examine specific observed completion and employment results that were associated with participation in the TRAMCON program and to understand patterns in credential completion and post-program wages of TRAMCON students. Descriptive and inferential statistics were used to answer the evaluation questions that guided the Outcomes Evaluation. There was no reasonable comparison group, and so an impact analysis was determined to not be feasible. Therefore, causal inferences cannot be made from the results

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[1] Patton, M.Q. *Essentials of Utilization-focused Evaluation.* Thousand Oaks, CA. SAGE Publications, Inc., 2012.
[2] Thomas, D.R. (2006). *A general inductive approach for analyzing qualitative evaluation data.* American Journal of Evaluation, 27, 237-245.

of these analyses. All student data used for the Outcomes Evaluation was administrative and collected from grant staff at each consortium college and entered into an Efforts to Outcome (ETO) database. For the final dataset, grant staff at Miami Dade linked all student IDs to Social Security Numbers (SSNs) and submitted the data to the Florida Department of Economic Opportunity (DEO), who provided all quarterly wage records associated with each of the student SSNs. Grant staff at Miami Dade removed the SSNs from the data file and merged the UI wage data with the original TRAMCON data file and securely transmitted the de-identified dataset to the Evaluation Team. The datasets included only information on students who earned credentials. The dataset used for the analyses of credentials was more robust than that used for the wage analyses, in that the dataset used for the analyses of credentials included more students, and as a result, more credentials. This was because the dataset with wages had to be pulled at an earlier date to ensure that there was enough time to collect and analyze UI wage data. Credential data was pulled again at a later date as grant staff reported there was a delay in receiving physical credentials for students, which resulted in credential data entry being delayed. The Evaluation Team analyzed student demographic data, industry-recognized credentials earned, and pre- and post-program quarterly wages using descriptive statistics. The Evaluation Team further analyzed the extent to which pre-and post-program wages differed, the influence of demographic data on student wage differences, and the number of credentials earned through inferential statistical tests, such as paired t-tests and General Linear Modeling (GLM) procedures.

Table ii. Outcomes Evaluation Research Questions

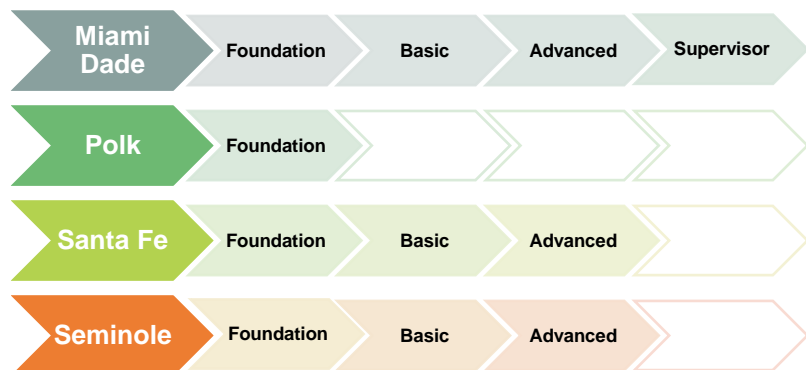| Outcomes Evaluation Research Questions |
|---|
| How does completion of credentials differ by demographic, academics, or geographic subgroup? How does credential completion at each college compare to TRAMCON as a whole? What is the variation in students earning credentials? |
| To what extent did student mean post-program wages change? How do student wages differ by demographic, academic, or geographic subgroup? What is the variation in post-program wages? |

Implementation Findings

Program Development & Fidelity of Implementation

The TRAMCON curriculum was developed by professors and faculty in the University of Florida's M.E. Rinker Sr. School of Construction Management. TRAMCON curriculum development processes included the development of two new NCCER credentials, Manufactured Construction Level I and Level II. Curriculum developers reported that the TRAMCON program was developed with flexibility in mind, so that the training could be modified, as needed, throughout the grant.

The extent to which the levels of TRAMCON were offered at each of the consortium colleges varied. These modifications resulted in implementation that was not completely aligned to the program model, the inherent flexibility in the design of the curriculum allowed for this customization in an intentional manner.

Figure iii. Levels of TRAMCON Program Offered

Miami Dade	Foundation	Basic	Advanced	Supervisor
Polk	Foundation			
Santa Fe	Foundation	Basic	Advanced	
Seminole	Foundation	Basic	Advanced	

Throughout the implementation of TRAMCON, the four curricular levels of the program remained the same, though some of the components and credentials shifted to other levels or were replaced with other relevant industry credential. These modifications occurred to better meet the needs of students, industry partners, and the programs at each college. Grant staff modified program delivery to meet the needs of the students, including offering both day and night courses, and increasing the amount of hands-on time. Grant staff at consortium colleges offered job placement assistance, including resume writing, mock interviews, and employability trainings, through local CareerSource staff and Job Developers hired through the grant.

Key Curricular Modifications
- OSHA 10 was replaced with OSHA 30 in Foundation and was also offered as a standalone in class in English, Spanish, and Creole.
- MSSC CPT was removed from Foundation, and was offered as a standalone class, a self-study, and offered by individual modules (e.g., Safety and Quality).
- Additional NCCER credentials were incorporated into the curriculum of the Basic level, including Carpentry, Cement finishing I & II, and Masonry I & II.
- On-the-job training requirements were flexed to require 1,000 hours of OJT before students could matriculate into the Supervisor level.
- MSSC Green Production credential was replaced with two NCCER credentials: Project Management and Sustainable Construction Supervisor in the Supervisor level.

Student Support Services
Grant staff utilized existing college resources, local CareerSource offices, the Coaches, and other grant staff to provide support to TRAMCON students. Services provided by grant staff were focused on recruitment, retention, and placement of TRAMCON students.

Recruitment:
- Grant staff across the consortium reported that recruiting for a new program in a new industry hindered early recruitment progress.
- Grant staff across the consortium were able to leverage relationships with community partners and employers to recruit students.
- TRAMCON students across the consortium reported a variety of reasons for enrolling in the program (e.g., national credentials, free training, hands on experience, needing a job).

Retention:
- The most utilized student supports reported across the consortium were related to providing soft skills and employability skills training.
- Coaches, Job Developers, and CareerSource representatives equipped students with job preparedness supports across the consortium.

Placement:
- Grant staff at Seminole were the only team successfully embedded a CareerSource partnership into their grant staffing structure.
- While grant staff assisted with placing students into employment opportunities throughout the grant, placement efforts were not a primary focus for grant staff until PY 3.

Key Partnerships

TRAMCON partners generally were part of four main categories: four-year institution partners; local CareerSource offices; correctional institutions; and employers and industry partners.

- Four-year institution partners designed TRAMCON curriculum, virtual reality components of curriculum, and the KSAO assessment (University of Florida, University of Wisconsin-Stout, Colorado State University).
- Employers and industry partners provided feedback on the relevance of credentials, attended career fairs and advisory committees for related programs, referred students to the program, and some contributed equipment to labs (Miami World Center, Palm Harbor Homes, QLM).
- CareerSource Central Florida embedded a staff member into Seminole's grant staff to assist with recruitment and placement.
- Correctional institutions allowed TRAMCON classes to be offered in their facilities or allowed those in work release programs to attend TRAMCON on campus (Polk Correctional Institute, Metro West Detention Center, John E. Polk Correctional Facility, Miami-Dade County Corrections Boot Camp).

Accelerators to Output Achievement

The TRAMCON Consortium leveraged a number of strengths, positioning it for ongoing success and sustainability. The most notable strengths included:

- Student satisfaction with the program across the consortium led to increased awareness of the program through word of mouth.
- In designing a program that could be flexible and customized to meet the industry and student needs of each area, the consortium adapted how they offered the program.
- Changing MSSC CPT from required to optional provided grant staff across the consortium opportunities for increased hands-on time and stronger retention with students.
- Grant staff across the consortium were able to engage local populations in non-traditional ways, increasing the reach of TRAMCON.

Barriers that Hindered Output Achievement

All new programs experience challenges and changes to plans. In establishing the TRAMCON program, the TRAMCON consortium encountered and overcame a number of barriers, including the following:

- The lack of an established manufactured construction industry in the areas of the colleges hindered both employer engagement and job placements in the intended industry.
- Grant staff at consortium colleges often worked in silos, rather than as a consortium.
- The development, and subsequent rollout, of the curricular components created by partners did not meet expectations of grant staff.
- Instructors reported that due to the "free program," some students were less engaged that they had hoped.

Participant Impacts and Outcomes

TAACCCT Outcomes

The TRAMCON Consortium exceeded targets for six of the key TAACCCT outcomes. The TRAMCON served nearly twice as many unique participants than the targets and had nearly three times the number of targeted program completers. The two outcomes that the TRAMCON Consortium did not meet were participants employed after the program and participants retained in employment; however, grant staff reported that they used UI wage data to calculate those outcomes and UI wage data is two quarters in arrears.

Figure iv. TRAMCON Consortium TAACCCT Outcomes and Targets
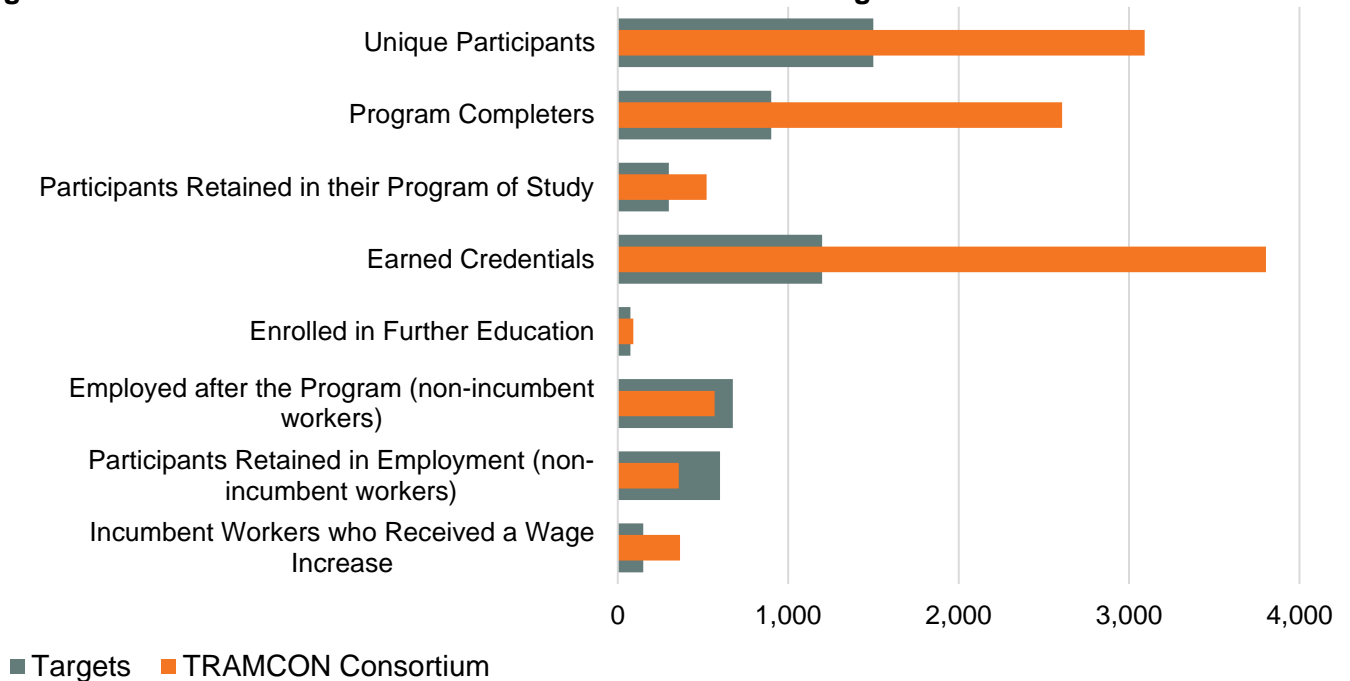
Credential Attainment

TRAMCON participants had the opportunity to earn up to seven industry recognized credentials if they completed all four levels of the TRAMCON program, including:

1. OSHA 30
2. NCCER Core
3. NCCER Manufactured Construction I
4. NCCER Manufactured Construction II
5. MSSC CPT
6. NCCER Project Management
7. NCCER Sustainable Construction Supervisor

Key Credential Attainment Findings

- Students who were not U.S. citizens and students who were older were more likely to earn more credentials.

- TRAMCON students were most likely to earn OSHA 30 and NCCER Core credentials (82.3% and 35.2%).
- Nearly 8.0% of students persisted to earn credentials beyond NCCER Core.

Table iii. Highest Credential Earned by College

	TRAMCON Consortium (N= 2,234)	Miami Dade (N=686)	Polk (N=765)	Santa Fe (N=277)	Seminole (N=506)
Earned only OSHA 30 and/or MSSC CPT	**61.6%**	54.4%	58.3%	51.6%	82.0%
Foundation: NCCER CORE	**30.4%**	22.2%	41.7%	42.6%	18.0%
Basic: NCCER MC I	**4.7%**	14.0%	0.0%	3.6%	0.0%
Advanced: NCCER MC II	**0.7%**	1.3%	0.0%	2.2%	0.0%
Supervisor: NCCER Project Management/Sustainable Construction Supervisor	**2.5%**	8.2%	0.0%	0.0%	0.0%

Post-Program Wage Analysis Findings

- Throughout the grant period, student wages increased from pre- to post-program.
- Students who earned at least one credential through the TRAMCON program had a significant increase in their average wages after earning their credential. The figure below shows the mean wages pre-and post-program for all students for whom wage data was available (N=1,132 pre-program; N=901 post-program).

Figure v. Mean Pre-and Post-Program Wages for All Students

Year & Quarter Student Enrolled (Excludes Q1-4 of 2018 Since No Wage Data in 2018)
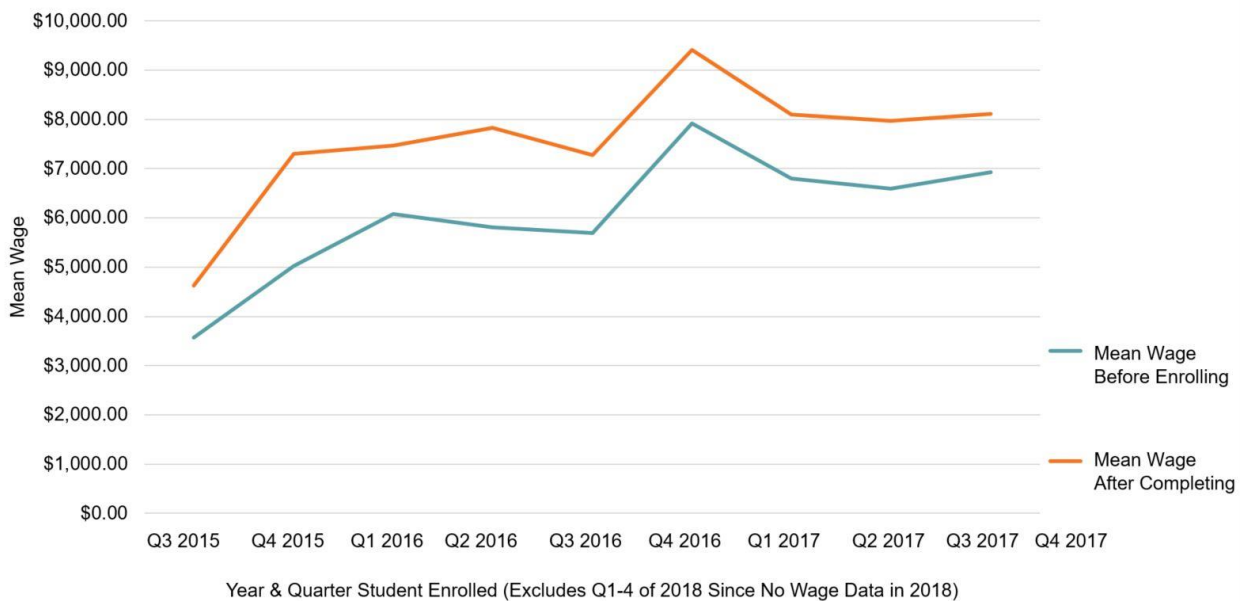
- Students at almost all consortium colleges saw an increase in their mean post-program wages. In total, post-program mean wages across the consortium were higher than pre-program mean wages by about $725.00.

Table iv. Mean Pre-and Post-Program Wages by College

	Pre-Program	Post-Program
TRAMCON Consortium (N=1,132/901)	**$6,327.16**	**$7,051.65**
Miami Dade (N=355/256)	$5,323.16	$6,561.97
Polk (N=245/238)	$5,982.38	$5,708.98
Santa Fe (N=173/113)	$4,939.32	$5,675.89
Seminole (N=359/294)	$8,224.07	$9,093.74

- Students wages after program completion were higher than pre-program wages, and the difference between the wages was statistically significant.[3] The effect size between the pre-and post-program wages for TRAMCON students was small (0.30), but not negligible. This means that that there was modest increase between pre- and post-program wages.
- Students with higher levels of education had higher post-program wages than those with less prior education but made smaller gains from pre- to post-program.
- When controlling for background characteristics, pre-program wages and prior education were significant predictors for students' post-program wages.

Limitations
- Without a reasonable comparison group, the Evaluation Team could not conduct a more rigorous evaluation that compared the effects of the TRAMCON program on students' wage outcomes. The Evaluation Team *cannot make claims* that the TRAMCON program *alone* contributed to the outcomes reported for TRAMCON students.[4]
- Due to the two-quarter delay in wage data, the Evaluation Team could not measure post-program wages for students who completed their credentials in the last five months of program implementation. Additionally, UI wage data was skewed, with some completers earning very low (e.g., $1) or very high (e.g., $85,978.00) quarterly wages. These data were trimmed to address these outliers.
- Data for the outcomes analysis was only available on students who earned a credential that counted towards the USDOL outcome of a program completer, meaning analysis could not be completed on persistency for students that did not earn credentials, or to determine completion rates for the levels of the program or credentials themselves.
- The duration of the program and length of the grant period may prevent the Evaluation Team from observing wage outcomes for a portion of the TRAMCON students, limiting the statistical power of the ability to detect effects. This may result in a type II error, in which the Evaluation Team incorrectly infers no impact when one exists (but may be too small to detect).

Conclusions

The implementation of the TRAMCON program as designed varied across the consortium, as grant staff at each college modified delivery models and aspects of the curriculum. However, qualitative and quantitative evidence suggests that TRAMCON students who earned credentials were able to secure higher wages after the program. Qualitative data suggests that USDOL funding contributed to the development and expansion of programs across the consortium, which

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[3] $p < 0.05$

[4] Gertler, P.J., Martinez, S. Premand, P., Rawlings, L.B. & Vermeersch, C.M.J. (2011). *Impact Evaluation in Practice.* Washington DC: The International Bank for Reconstruction and Development/ The World Bank.

are likely continue in some variation at all four colleges. Additionally, grant funding allowed consortium colleges to develop additional industry and community partnerships that are likely to be sustained following the grant period.

Recommendations for Replication

For institutions considering replicating the TRAMCON program, the following recommendations were offered by grant staff:

- Identify the relevant local employers and industries prior to implementation to ensure the curriculum includes credentials that are recognized and relevant in the area. The TRAMCON program's flexibility provides future implementers the opportunity to modify the program to be relevant to local employers and meet industry needs, and grant staff reported early identification of these needs could improve implementation.

- During implementation, remain flexible in program delivery methods and curriculum content, as needs of employer and students can evolve over time. After determining the core components of the curriculum, TRAMCON implementors should make efforts to continuously improve the program and modify the program to meet student and employer needs.

- If grant funds cannot be procured and other opportunities to offset student costs are not available, other institutions could offer TRAMCON as a 2-year credit program so that students can apply for financial aid. The program was designed to provide training to unemployed and underemployed students, and grant staff reported that students would not have the ability to enter into a full-time training without additional financial assistance.

Future Research

A review of evaluation findings and evaluation limitations suggests several avenues for future research. The Evaluation Team has identified four areas where further research may yield grater insight into the effects of the TRAMCON program.

- Conduct a study of the TRAMCON program implemented in conditions conducive to a quasi-experimental design, either through structured program start and end dates, or at institutions with prior short-term training programs. This would allow researchers to measure the extent to which the TRAMCON program impacts wage and employment outcomes.

- Research the impact of the program through an extended post-program observation window which would provide the opportunity to measure the effects of TRAMCON over a longer period of time. This would also allow researchers to include more students in the analysis, especially those enrolled in higher levels of the program as they are likely to complete the program later in the implementation period.

- Through more robust data collection, future research could include all students that enrolled in TRAMCON which would allow for additional analysis on completion of the various levels of the program and student persistence.

- Future research could explore the types of industries in which TRAMCON students obtain employment and measure the extent to which wages vary by industry.

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INTRODUCTION

Purpose and Background

In 2014, the Florida Training for Manufactured Construction (TRAMCON) consortium received a grant of $9.9 million through the U.S. Department of Labor's (USDOL) Trade Adjustment Assistance Community College and Career Training (TAACCCT) program. The consortium is comprised of four public Florida colleges: Miami Dade College (Miami Dade), Polk State College (Polk), Santa Fe College (Santa Fe), and Seminole State College (Seminole). The purpose of TRAMCON was to deliver training to meet the needs of TAA-eligible workers, veterans, and other non-traditional learners across Florida. Ultimately, TRAMCON sought to increase job placements for program participants by training them for careers in the manufactured construction industry.

As part of grant requirements, TRAMCON procured an independent contractor, Thomas P. Miller & Associates, LLC (TPMA) to conduct an evaluation of the project. TPMA led both the Implementation Evaluation and the Outcomes Evaluation. The evaluation provided TRAMCON, its partners, its funders, and other stakeholders with critical information regarding the effectiveness of the program.

Report Purpose and Organization

This evaluation assessed how the well the program implemented its components, examined its implementation and contextual challenges, documented mid-course corrections and decisions, and determined student outcomes attributable to the TRAMCON program. This is the final summative evaluation report for the TRAMCON program. It builds on and references the interim report submitted to USDOL in 2016, which provided a detailed analysis of the TRAMCON program implementation from its initial stages to full implementation. This first section of the report presents the originally designed TRAMCON model, followed by a summary of the methodology and research questions for the Implementation Evaluation and the implementation findings. The methodology, research questions, and findings from the Outcomes Evaluation follow the Implementation findings. The Implementation Evaluation findings retrospectively help illustrate the actions and contexts that lead up to the outcomes. The final sections look beyond TRAMCON's funding period and describe sustainability forecasts based on discussions with program staff and present recommendations for other institutions interested in pursuing a similar program design and USDOL stakeholders.

INTERVENTION OVERVIEW

The TRAMCON program was developed to meet the needs of the future of the construction industry, according to the designers of the TRAMCON concept. TRAMCON was designed with a belief that the principles of efficiency seen in the world of manufacturing lend themselves well to the construction industry. Beyond work at the construction site, TRAMCON's designers reported that the future of the construction industry is anticipated be connected with manufacturing, as pre-cast, pre-fab, and modular building components continue be delivered to the construction site from a manufacturing facility.

The TRAMCON program was designed to develop a new national credentialing system and career pathway, the Manufactured Construction Training and Education Pathway (MCTEP), for the manufactured construction workforce. TRAMCON participants were educated on a wide variety of trades associated with the manufacturing and construction industries. By design, students who completed the TRAMCON program entered the workforce with foundational skills in trades such as plumbing, carpentry, heating ventilating and air conditioning (HVAC), electrical
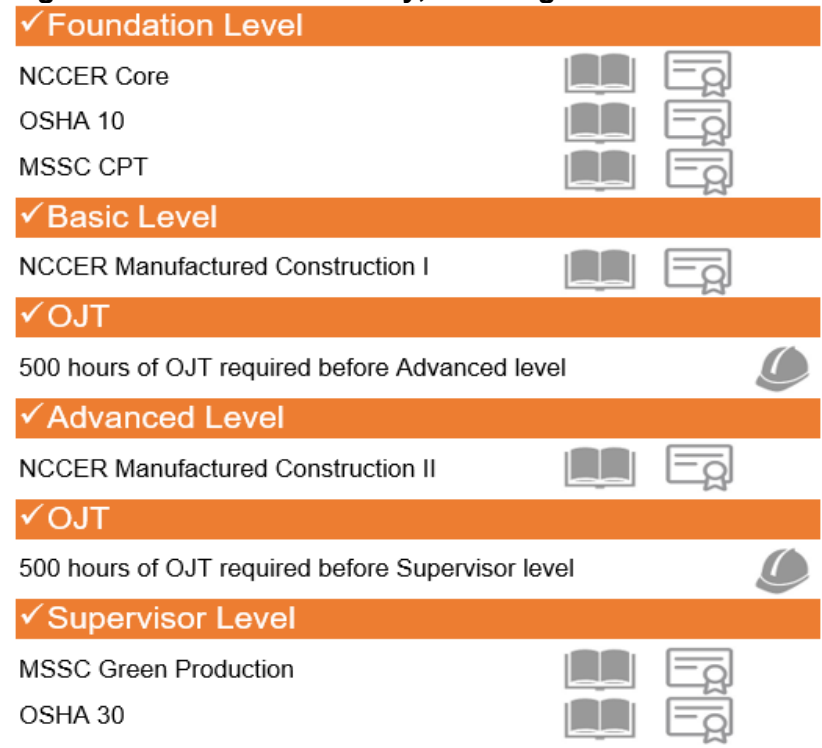
systems, and production techniques. The broad base of skills developed in the TRAMCON program were designed to allow students to pursue a variety of fields, but instructors reported that it typically does not provide students with sufficient skills to be considered a specialist in any one trade.

Original TRAMCON Program Model

The TRAMCON program pathway was segmented into four distinct coursework blocks: **Foundation, Basic, Advanced, and Supervisor**. Along the pathway, participants had the opportunity to earn national industry recognized credentials from both the construction and manufacturing sectors. The program provided a multi-entry, multi-level stacked and latticed credentialing system. TRAMCON stakeholders, including the University of Florida, worked with the National Center for Construction Education and Research (NCCER) to develop the NCCER Manufactured Construction Level I and Level II credentials. Additional credentials were available through Occupational Safety and Health Administration (OSHA), NCCER, and Manufacturing Skill Standards Council (MSSC). The program was designed to be free for students, with the exception of costs related to fees for the assessments required to earn industry recognized credentials.

Below is a diagram of the program pathway - as originally designed - of the four levels for the TRAMCON curriculum and the credentialing system. Students could enter and exit after any level, depending on their individualized career and educational goals. Students were expected to participate in 500 hours of on-the-job training (OJT) between each Basic and Advanced, and Advanced and Supervisor levels. Each level offered students the curriculum associated with relevant industry recognized credentials, and students had the option to take the assessments to earn the credentials after completing the coursework.

Figure 1. TRAMCON Pathway, as Designed

✓Foundation Level
- NCCER Core
- OSHA 10
- MSSC CPT

✓Basic Level
- NCCER Manufactured Construction I

✓OJT
- 500 hours of OJT required before Advanced level

✓Advanced Level
- NCCER Manufactured Construction II

✓OJT
- 500 hours of OJT required before Supervisor level

✓Supervisor Level
- MSSC Green Production
- OSHA 30

Throughout implementation, the four levels of the program remained the same. However, some of the components and credentials shifted to other levels, or were replaced with other relevant industry credentials, so as to meet the needs of students, industry partners, and the programs at each college. These shifts in implementation of the program from the original design are discussed in greater detail in the Modifications of TRAMCON Curriculum and Program Delivery section of this report.

Strategic Alignment

A required component for all TAACCCT grantees was to integrate USDOL's core elements for successful program development into the grantee's program concept and vision. TRAMCON grant staff integrated all core elements into the program, however some elements were more successfully implemented than others. Throughout this report, the successes and challenges of implementing these core elements are discussed in greater detail.

Table 1. Evidence of Core Element Integration

Core Elements	Evidence
1. **Evidence-Based Design**	All six of the grant strategies incorporated into the program were based on moderate and strong evidence.
2. **Career Pathways**	TRAMCON was used to accelerate program participants into employment using modularized curriculum. Opportunities for contextualized learning were identified to assist adult learners who may have needed additional remedial supports, as were coaching and mentoring opportunities to ensure that the career pathway developed accommodated all types of learners.
3. **Advanced Online and Technology-Enabled Learning**	Curriculum included virtual construction modeling technology and lab-based instruction, allowing participants more hands-on skills practice than what is offered in a traditional program.
4. **Strategic Alignment with the Workforce System and Other Stakeholders**	TRAMCON leadership anticipated communication and coordination with local CareerSource offices through embedding CareerSource representatives in grant teams at each college.
5. **Alignment with Previously Funded TAACCCT Projects**	Grant components were aligned to previous TAACCCT grants including the use of I-BEST for contextualized learning, the incorporation of 3D simulations and gaming design, and the use of a KSAO[5].
6. **Sector Strategies and Employer Engagement**	When shifting the focus from OSHA 10 to OSHA 30, allowing for modules like MSSC to be offered as a standalone option, adding additional modules in carpentry and masonry, and by embedding soft skills into classrooms, TRAMCON grant staff continued to support employer-identified gaps within their industry's career pathway.

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[5] Meridian Community College's RETRAINING the Gulf Coast Workforce grant (IBEST) and Central Community College's IMPACT grant (3D simulation and KSAO).

Grant Strategies in Action

The grant narrative outlined six strategies that were to be implemented by the TRAMCON consortium throughout the grant period; these strategies were implemented to varying extents by the grant staff at consortium colleges. In some cases, program partners were tasked with developing a tool for implementation, and the ability of grant staff to implement the strategy was contingent of the work of program partners.

As articulated in the grant narrative, the six strategies included:

1. **Advanced assessment of for career awareness, work readiness, and program placement** – To accomplish this strategy, the TRAMCON program model incorporated a Knowledge, Skills, Abilities, and Other (KSAO) assessment. The KSAO assessed students' levels of motivation, career awareness and interest, and learning styles. Students were assessed during the first week of class, and grant staff and instructors were to receive the results so that instruction approaches could be modified for students.
2. **Develop national standards-based career pathway opportunities** –The TRAMCON curriculum was designed to align to national industry standards, to articulate into credit bearing programs for advanced educational opportunities and aligned to industry recognized credentials.
3. **Contextualized Basic Skills Integration** – Contextualized learning was integrated into the TRAMCON program through the use of the team-teaching approach from the IBEST model and contextualized remediation was provided to students.
4. **Interactive virtual reality manufactured construction simulation** – Partners developed interactive virtual reality simulations as interactive exercises for TRAMCON students.
5. **Enhanced coaching and student-employer mentorship for program retention** – Coaching and mentoring of students was incorporated to increase program retention and training effectiveness.
6. **Transformative learning technology for recruitment and entrepreneurship** – Experiential learning labs were integrated into the TRAMCON program for hands-on and experiential learning opportunities and to create a bridge between the classroom and the production floor.

The table on the following page identifies the ways in which the different strategies were implemented across the consortium. The TRAMCON column of the table is color coded based on the extent to which the stated strategies were implemented with fidelity. Green signifies that staff at all four consortium colleges implemented the strategy with fidelity, yellow signifies that staff at 2-3 colleges implemented the strategy with fidelity or all colleges implemented but without fidelity, and red notes strategies that were not implemented by staff at any of the colleges. There were no instances of only one college implementing a strategy.

Table 2. Fidelity of Implementation of Grant Strategies

Grant Strategies	TRAMCON Consortium	Miami Dade	Polk	Santa Fe	Seminole
1. **Advanced assessment of for career awareness, work readiness, and program placement**	**GREEN** *The consortium administered KSAO assessments and University of Colorado analyzed the data*	Administered KSAO in all classes	Administered KSAO in all classes, except for OSHA 30	Administered KSAO, instructors reported using feedback to adjust instructional approaches	Administered KSAO during orientation and at the end of the course
2. **Develop national standards-based career pathway opportunities**	**GREEN** *The pathway was developed, students sought employment after various levels of the program.*	Pathway developed, and students pursed careers after various levels of the pathway	Pathway developed, and students pursued careers after OSHA training or Foundation level	Pathway developed and connects to career opportunities and apprenticeship programs	Pathway developed, and students pursued careers after various levels of the pathway
3. **Contextualized Basic Skills Integration**	**YELLOW** *The IBEST model was implemented at half of the consortium colleges*	IBEST was not incorporated into classes	IBEST was not incorporated into classes	IBEST was implemented until PhiCaps funding ended	IBEST was implemented in classes
4. **Interactive virtual reality manufactured construction simulation**	**RED** *UW-Stout completed the virtual reality simulation after performance period ended and Revit software was reported as too complicated for consistent use*	Not utilized during the grant performance period	Not utilized during the grant performance period	Not utilized during the grant performance period	Not utilized during the grant performance period
5. **Enhanced coaching and student-employer mentorship for program retention**	**YELLOW** *While mentorship and coaching occurred, it mostly occurred through grant staff and instructors, rather than employers*	Instructors mentored students and grant staff providing coaching supports for retention	Grant staff and instructor mentored students, mostly utilized by those who participated beyond OSHA 30 training	Grant staff and instructors mentored students, grant staff completed individualized learning plans for all students	Instructors informally mentored students and grant staff provided follow-up coaching for retention
6. **Transformative learning technology for recruitment and entrepreneurship**	**GREEN** *TLC equipment for hands-on learning was used in all labs, but some staff reported challenges with the equipment and curriculum*	60/40 split between time in the lab and time in the classroom, TLC equipment utilized in labs	YouthBuild participants utilized lab equipment, some lab equipment and tools used with PCI cohorts	Utilized lab spaces daily, however instructors reported that TLC equipment did not connect well to the curriculum	60/40 split between time in the lab and time in the classroom, TLC equipment utilized in labs

Staffing and Turnover

Staffing Structure

To effectively manage the TRAMCON program's many components across all colleges in the consortium, grant staff formed implementation teams with clearly defined roles and responsibilities. Grant staff at each college filled four main staff roles:

- **Program Managers** who executed the day-to-day activities within the TRAMCON program.
- **Retention, Recruitment, and Completion Coaches (Coaches)** who were primarily responsible for program recruitment and supporting students by connecting them to student services.
- **Outcomes and Data Specialists** who were responsible for tracking program data and entering data into Efforts to Outcomes (ETO), the data management system utilized by the consortium.
- **Job Placement Specialists** who worked with students to prepare them for job placement through offering supports such as resume writing workshops, and who worked with employers to identify open positions. At Seminole, this position was filled by a representative from the local CareerSource agency, while grant staff at other colleges hired their own placement specialists to fill this role.
- **Other grant staff positions** utilized throughout the consortium included instructors, program coordinators, and program assistants.

Additionally, the consortium itself was staffed by a **Consortium Director** who was housed at Miami Dade, and who oversaw the operations of the entire consortium and who was responsible for ensuring that program goals were appropriately met. The Consortium Director was supported by a **Data and Finance Specialist** who oversaw data collection and financial reporting across the TRAMCON consortium.

Table 3. Staffing Structure, by College

	TRAMCON Consortium	Miami Dade	Polk	Santa Fe	Seminole
Staffing Structure	• Consortium Director • Data and Finance Specialist	• Program Manager • 2 Completion Coaches • Outcomes and Data Specialist • 2 Placement Specialists • Program Assistant • Instructors	• Program Manager • Completion Coach • Program Coordinator • Program Assistant • Instructor	• 2 Program Managers • Completion Coach • Placement Specialists • Outcomes and Data Specialist • Instructors	• Program Manager • Completion Coach • Outcomes and Data Specialist • CareerSource Representative • Instructors

Staff Turnover

Throughout the grant period, grant staff teams experienced varying levels of staffing turnover. Staff at colleges where the grant teams remained fairly consistent reported that the team's staffing stability contributed to program success, as the grant teams operated smoothly. At colleges where grant staff turnover occurred, staff reported that the turnover resulted in adjustment periods in which new grant staff were acclimating to their program responsibilities. However, they reported

that, ultimately, the changes that occurred benefited grant staff, once staff were fully acclimated. Existing grant staff often reported that new grant staff were "stronger" candidates and "better fits" for the grant positions, which grant staff reported resulted in stronger program implementation.

At the consortium level, both the consortium-level staff members left the grant during PY 3. Staff reported that this change resulted in an initial delay in grant momentum while new consortium leadership learned about the grant program and activities that had occurred to date. However, once the new leadership was in place, staff across the consortium reported that grant activities continued to be implemented.

The table below, highlights the staffing turnovers that occurred at each consortium college. The speedometers depict the impact of staff turnover, as it was reported by remaining staff. The impact of staffing turnover ranged from not significant to the implementation of the grant, to moderately significant, and to very significant to the implementation of the grant.

Table 4. Staffing Turnover, by College

	TRAMCON Consortium	Miami Dade	Polk	Santa Fe	Seminole
Grant Team Staffing Changes	Turnover of Consortium Director and Data and Finance Specialist during PY 3	Turnover in Program Manager position, Completion Coaches, added two Job Placement Specialists	Early departure of Outcome and Data Specialist in PY 1, no additional core team turnover	No turnover in core grant staff team, added a Job Placement Specialist in PY 4	Turnover within CareerSource Representative position and in PY 3, departure of Completion Coach

IMPLEMENTATION EVALUATION

The Implementation Evaluation began August 2015 and continued through March 2018[6] to document program progress, to monitor program outcomes, and to provide recommendations for continuous improvement of program operations. The Evaluation Team conducted a formative and summative evaluation, primarily focused on the development of the TRAMCON training programs and on the contextual factors influencing implementation.

Implementation Methodology

The Implementation Evaluation was intended to be a key element in learning lessons along the way to enhance program implementation and results in real-time. Evaluation feedback was provided through analysis of the following primary themes:

- Progress toward achieving certain program outcomes or milestones
- Program accelerators, barriers, and environmental factors
- How strategies or activities not successfully implemented could be adapted or modified to the realities of the circumstances surrounding the project
- Context for sustaining certain project activities

To gather information on the themes above, the Evaluation Team relied on first-person accounts of grant experiences gathered via conference calls, phone and in-person interviews, and program document reviews:
- Monthly (in 2015 and 2016) and quarterly (in 2017 and 2018) implementation update calls with the Project Manager and grant staff at each college, and with consortium leadership
- In-person and phone interviews with TRAMCON staff and instructors; college leadership, staff, and faculty, and participants during site visits in 2016 and 2017
- TRAMCON documents, including quarterly program reports, and TRAMCON outcomes analysis updates.

The Implementation Evaluation allowed the Evaluation Team, grant staff, and TRAMCON stakeholders to better understand the program's core activities and descriptively evaluate how the operations of TRAMCON functioned. The evaluation placed the outcomes of the intervention into context with the implementation process and examined whether the program was implemented as designed. This allowed the Evaluation Team to uncover any potential threats to the validity of the evaluation and helped program staff understand how the process might be modified to produce greater results.

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[6] TRAMCON grant implementation took place up to March 30, 2018. The period of April 1, 2018 through September 30, 2018 was additional time for evaluation analysis and reporting. The TRAMCON consortium received an extension for selective services that took place through July 31, 2018.

Implementation Research Questions

The following set of research questions guided the Implementation Evaluation and provided a normative basis for the evaluation.[7]

1. How was the particular curriculum selected, used, and/or created?
2. How were programs and program designs improved or expanded using grant funds?
    a. What delivery methods were offered?
    b. What was the program administrative structure?
    c. What support services and other services were offered?
3. How were assessment tools used to select participants for the grant program?
    a. Was an in-depth assessment of participants' abilities, skills, and interests conducted to select participants into the grant program?
    b. What assessment tools and processes were used?
    c. Who conducted the assessment?
    d. How were the assessment results used?
    e. Were the assessment results useful in determining the appropriate program and course sequence for participants?
    f. Was career guidance provided, and if so, through what methods?
4. What contributions did each of the partners (i.e., employers, workforce system, other training providers and educators, philanthropic organizations, and others as applicable) make in terms of: (1) program design, (2) curriculum development, (3) recruitment, (4) training, (5) placement, (6) program management, (7) leveraging of resources, and (8) commitment to program sustainability?
    a. What factors contributed to partners' involvement or lack of involvement in the program?
    b. Which contributions from partners were most critical to the success of the grant program?
    c. Which contributions from partners had less of an impact?
5. What program outputs have been generated to date?
    a. What barriers hindered output achievement?
    b. What factors unexpectedly improved output achievement? Why?
6. How satisfied were program partners, staff, and participants with the program? Why?
7. What have been successes and obstacles to program performance?
8. How can program processes, tools, and/or systems be modified to improve performance?
9. How can the program expand or enhance institutional capacity?
    a. What are the most promising programmatic components to use institution–wide? Why?

These questions are referenced throughout the remainder of the Implementation Evaluation section.

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[7] Research Questions 1-4 were required by USDOL. Research Questions 5-9 were added by the Evaluation Team.

Data Sources

The Evaluation Team collected data from the following sources to address the research questions for the Implementation Evaluation:

Table 5. Data Sources

Primary Data Source	Description
Implementation Update Calls	The Evaluation Team gathered qualitative data tracking program implementation progress through monthly calls in 2015 and 2016 and quarterly calls in 2017 and 2018.
Program Documents	The Evaluation Team reviewed reports developed by the Consortium Director for USDOL submission.
TRAMCON consortium meeting	The Evaluation Team attended the May 2018 TRAMCON consortium meeting and participated through sharing evaluation updates and gather additional data. Additionally, participating in this meeting, allowed the Evaluation Team to conduct a data validity check.
Program Site Visits (program staff and instructor interviews, partner interviews, and participant group interviews)	The Evaluation Team gathered qualitative data during two site visits to the colleges in March of 2016 and March of 2017. During these visits, the Evaluation Team conducted interviews with program staff, college level administrators, and instructors to learn their perceptions of the program's implementation process. They also conducted group interviews with participants to learn their perceptions of the program components. As available, the Evaluation Team conducted interviews with employer partners and representatives from local CareerSource offices. All of the protocols used during these site visits can be found in Appendix B.

Analysis Methods

To conduct a descriptive analysis of program implementation and the contextual factors influencing implementation, the qualitative data generated from interviews was placed into a matrix that listed responses by interview question (row) and college/program role (column). Program roles included grant staff, grant instructors, consortium leadership, college staff, and students. Based on participant responses, key words were identified and listed in the appropriate column and row. Key words were then grouped across colleges, programs, and roles to identify commonalities and differences. Further, responses associated with key words were identified as positive, negative, or neutral to assist in identifying perceived successes and challenges.

Once groupings were identified based on review of interview data, the Evaluation Team augmented the information with a review of (1) notes taken during monthly (later quarterly) implementation update calls; (2) detailed notes taken during site visits (conducted during March 2016 and 2017), including direct quotes; (3) TRAMCON documents, including quarterly reports; and (4) the Team's extensive experience with technical training programs and the body of evaluation knowledge built through their work. Further, these sources were used to develop and refine interview and focus group questions for each site visit, including areas that might need further exploration. Guidance about what was important came from the grant narrative, research questions, and calls that had occurred throughout the grant period. The following descriptive categories are used in the report:

- *Progress* – Documentable steps taken to advance or achieve grant outcomes, deliverables, milestones, and/or goals;
- *Accelerators/Strengths of Progress* – Documentable achievements along with contextual factors that enhanced grant progress and improved the ability of grant staff to carry out

grant initiatives, focused on internal factors (program design, modification, implementation, and application);

- *Barriers/Challenges to Progress* – Documentable shortcomings in achievements, along with contextual factors that hindered grant progress and delayed or prevented grant staff from carrying out grant initiatives;
- *Recommendations* – Opportunities the Evaluation Team identified for improving progress toward grant outcomes (in Interim Reports), and recommendations for other educational institutions looking to start similar programs; and
- *Sustainability* – Components of the program that are planned to continue once funding ends.

The final step in the analysis was to send the summarized results to the Consortium Director and grant leadership at each college for clarification and additional contextual details.

To strengthen the accuracy and credibility of Implementation Evaluation findings, the Evaluation Team relied on triangulation, including reviewing outcomes data and identifying the ways in which it corroborated or conflicted with information from the Implementation Evaluation, as well as collaborative inquiry. By comparing findings based on different data sources and using approaches that incorporated both evidence and negative evidence, the Evaluation Team created a robust and dynamic depiction of implementation. By presenting findings to TRAMCON stakeholders for elaboration, corroboration, and modification, the Evaluation Team confirmed and updated analyses. Additionally, by sharing findings with intended users as they emerged, the Evaluation Team built a collaborative relationship with stakeholders that encouraged higher quality first-person data and increased the likelihood the evaluation produced timely, user-relevant findings.

Reporting of Results

Data were reviewed, interpreted, and included in the annual reports in 2015 (Program Year (PY) 1) and 2017 (PY 3), the interim report in 2016 (PY 2), and this final report, finalized by September 30, 2018. The reports contain the results of the analysis and recommendations for program enhancements (interim report only), and lessons learned. An in-depth review of these reports was conducted by the Consortium Director and grant staff for member checking, factual verification, and elaboration on findings and recommendations. Subsequently, the reports were submitted to the USDOL by the TRAMCON Consortium Director. Quarterly reports were developed throughout the implementation period, providing programmatic updates and data on specific concepts.

Limitations

Limitations for the Implementation Evaluation included the following main elements, as well as the steps that were taken to mitigate the limitations:

Limited Data Sources – When possible, the Evaluation Team used data triangulation to verify narratives and other information shared by key stakeholders. Triangulating data from multiple sources, such as comparing findings among stakeholder interviews with outputs and outcomes data, creates more credible evaluation results. However, the Evaluation Team often was faced with a limited number of data sources. The Consortium Director and grant staff provided a majority of information to the Evaluation Team, and the evaluators were unable to triangulate some of this information due to a lack of other sources, including missing or incomplete data.

Partial and Biased Findings – Qualitative and perceptual research methods offer good insights, but are, by nature, partial and biased. For this evaluation, perceptual information (data gathered through focus groups and interviews with staff, stakeholders, and participants) was the primary mechanism by which information was obtained to gauge successes and challenges of the project. The Evaluation Team was faced with a limited number of additional data sources (quantitative and qualitative) to support these findings. To attempt to address this limitation, the Evaluation Team used data triangulation whenever possible, including interviewing multiple stakeholders.

Respondent Order Effect – During site visits, the Evaluation Team conducted group interviews for students within the chosen classes. At these group interviews, participants more interested in sharing their opinions of the program may have spoken up at a greater rate than other students. This may have created a pecking order bias by participants self-selecting their response order (i.e. certain participants go first, and others go last). Receiving a range of feedback from participants, from positive to critical, supports the notion that a spectrum of student experiences was captured; however, it is possible that bias related to the participant response ordering was introduced into the evaluation.

Researcher Extrapolation – Analysis conducted with an interpretive analytical framework suffers from the threat that researcher extrapolation and interpretation may go too far beyond what is present in, and supported by, data.[8] Indeed, the recommendations provided in this report are based on a combination of what was learned and supported by data and the experiences and findings of the evaluators' previous experience designing, implementing, and evaluating various workforce development programs.

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[8] Guest, Greg, MacQueen, K.M., and Namey, E.E. *Applied Thematic Analysis*. Thousand Oaks, CA. SAGE Publications, Inc., 2011.

Key Implementation Evaluation Findings
## Implementation of TRAMCON Program
Overview of Program

The TRAMCON program pathway was segmented into four distinct coursework blocks: Foundation, Basic, Advanced, and Supervisor. Along the pathway, participants had the opportunity to earn national industry recognized credentials from both the construction and manufacturing sectors. The program provided a multi-entry, multi-level stacked and latticed credentialing system.

The TRAMCON program was offered as a non-credit bearing course and was free to students. The TRAMCON program, however, did not cover the costs of textbooks or testing fees associated with earning the industry recognized credentials. Grant staff at each college reported that participants often were not working, or were working low paying jobs, while attending TRAMCON classes and were often unable to pay the associated costs. In order to assist participants who cannot afford textbooks and assessments, grant staff worked to secure a donated set of textbooks for classrooms, leveraged other college funding to supplement the costs, and worked with community organizations, such as Community Action, to secure funding for students.

During the grant period, the extent to which the levels of TRAMCON were offered at each of the consortium colleges varied. Miami Dade was the only consortium college to offer the Supervisor level of the program. They reported that for incumbent workers in the night program, their day jobs often served as an opportunity to meet the OJT requirements, thus allowing them to enroll in the Supervisor level. The figure below demonstrates the extent to which the levels of TRAMCON were offered at each of the consortium colleges.

Figure 2. Levels of TRAMCON Program Offered by Consortium College
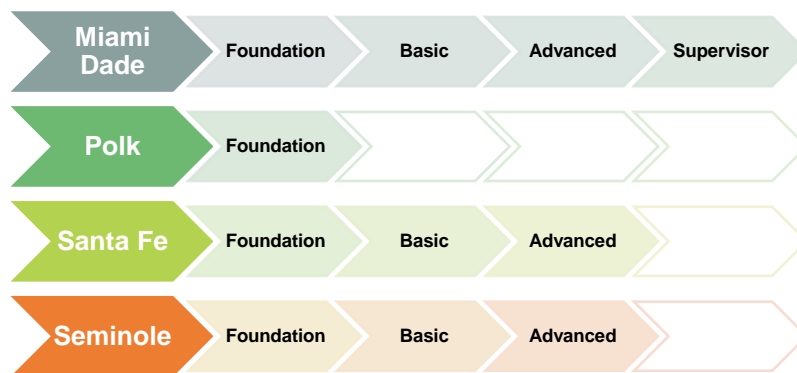
Grant staff at Santa Fe and Seminole reported interest in providing the final level of the program but were unable to do so. Santa Fe reported that when the Supervisor curriculum was released, they did not have any students interested in moving on, and those students who were still in lower levels would not have had time to reach Supervisor by the end of the grant period. The Program Manager at Seminole reported that neither of their instructors had the requisite credentials necessary to teach the Supervisor level, and that there was not enough time for the instructor to earn the credentials and teach a complete level of Supervisor in the grant period. The Program

Manger reported that had they realized earlier in the grant that there were credentials required for the instructors for Supervisor, they would have attempted to address the challenge earlier.

Grant staff at Polk reported that while they wanted to be able to offer Basic classes, students often needed to seek employment immediately after completing Foundation, and there were not enough students interested in persisting into Basic. Additionally, grant staff reported that the same instructor would have had to teach both Basic and Foundation, so during Basic, the instructor "would be out of commission for Foundation" until the end of the Basic cohort.

Program Delivery

Across the consortium, grant staff developed the schedules for offering TRAMCON that best suited the needs of their student populations. For many colleges, this included offering both day and evening cohorts, to accommodate both traditional students and also incumbent workers who needed to attend classes outside of their standard working hours. At Miami Dade, grant staff were able to provide TRAMCON training at two campuses, in an effort to increase access to the TRAMCON program throughout the expansive Miami community.

Table 6. Summary of Program Delivery, by College

	Miami Dade	Polk	Santa Fe	Seminole
Standalone OSHA 30	Offered in English, Creole, and Spanish	Offered through ABC	N/A	Offered on campus as feeder into Foundation
Foundation	Day cohorts; offered at two campuses	Day cohorts offered at PCI, additional cohorts trained off campus through partnerships with YouthBuild	Day and evening cohorts (OSHA 10 in evening cohorts)	Day and evening cohorts
Basic	Day and evening cohorts offered at two campuses	N/A	Day and evening cohort	Combined Basic and Advanced into one class, day cohorts only
Advanced	Day and evening cohorts offered at two campuses	N/A	Day and evening cohorts and Self-study cohorts	
Supervisor	Day and evening cohorts offered at two campuses	N/A	N/A	N/A

Grant staff also provided students with the opportunity to enroll in standalone OSHA 30 cohorts. However, some grant staff across the consortium reported that the "spirit" of the grant may have been lost in doing so. In offering standalone OSHA 30 classes, for example, grant staff reported that they were able to meet grant deliverables related to the number of industry credentials awarded. However, many participants reportedly enrolled in TRAMCON only for the standalone OSHA 30 class and did not persist into any of the construction related curricular components. Grant staff reported that while having an OSHA 30 card is in high demand in industry and often participants were able to gain employment after earning the credential, thus meeting the overall goal of the grant, without any of the construction or trades related trainings grant staff felt that "the initial intention of the grant was diluted for some participants". Consortium leadership reported that while some participants did not receive manufactured construction-specific related training,

over 3,800 industry related credentials were earned during the program, and that the TRAMCON program served over 3,090 students throughout the four-year grant period.

Delivering TRAMCON Training to Incarcerated Populations

Three of the four consortium colleges (Miami Dade, Polk, and Seminole) served incarcerated populations during the grant period. Grant staff at Polk were the first to offer programming in a correctional institution and began working with Polk Correctional Institution (PCI) near the onset of the grant to determine how to bring the TRAMCON program to inmates who would soon be released. Grant staff reported that a relationship with PCI was established during a previous TAACCCT grant at the college. Grant staff at Polk reported working with PCI to determine how to safely bring in equipment for the students to learn how, how to navigate testing when there are no computers, and how to ensure that the students in the self-contained cohort had the best learning experience possible. "You have to get in the mindset that you aren't in control," explained one staff member, "you're a guest in their house, if something won't work, find another way." Grant staff at Polk reported that they worked to adapt the curriculum for these cohorts, for example, one grant staff member reported, "for the NCCER knot tying, you can't use rope in a prison. But we could use other materials to practice tying knots. If you can't bring something in, you have to find the alternatives."

Learning from the successful implementation of TRAMCON programming at PCI, grant staff at Miami Dade and Seminole both forged relationships with local correctional institutions and offered components of the TRAMCON program to inmates in their communities. However, the Program Manager at Seminole reported that grant staff were unable to bring tools into the local prison. Due to this restriction, grant staff offered the written portion of NCCER CORE and the demo portions that did not require tools. The Program Manager reported "we only got students within 90 days of release" with the goal of students going to Seminole to receive the remaining hands-on portion of the curriculum.

Table 7. College Programing in Correctional Institutions

	Miami Dade	Polk	Seminole
Partner Facility	Miami-Dade County Correction Boot Camp; Women's Correctional Facility	PCI	John E. Polk Correctional Facility
Program Offered/Credentials	OSHA 30 at Miami-Dade County Corrections Boot Camp, then TRAMCON levels offered at Miami Dade OSHA 30 at Women's Correctional Facility	Foundation level and some Manufactured Construction Level I (from Basic)	Foundation level and MSSC CPT

The Consortium Director reported that the ability to serve the prison population through multiple consortium colleges was one of the most notable successes for the consortium. "To have those types of turnarounds where someone is at the bottom and here they are moving forward with their lives and they feel restored is just priceless," explained the Consortium Director. Grant staff at each of the colleges that served incarcerated populations reported the students' achievement was one of the successes of the program. Grant staff at Polk reported that, "to see

those guys get trained, get jobs, and build self-efficacy" was something they were "incredibly proud to be part of" and was one of the most successful parts of the program. Staff at all three colleges reported similarly that training in the prison system allowed "folks who thought they'd ever be able to attain some kind of a certificate to earn one." One instructor who taught in the prisons reported, "it's an interesting and intriguing way to deliver this program to incarcerated persons who are looking for a second chance."

For staff at colleges where TRAMCON served incarcerated populations, staff reported that this program allowed inmates to be prepared for jobs upon their release, as they had earned industry credentials while serving their sentences. Cadets from the Miami-Dade County Corrections Boot Camp (Boot Camp) are supported by staff from Transitions, Inc., a non-profit organization that assists returning citizens to reenter society after incarceration, including placement and case management services. For students in the Boot Camp program, staff from Transitions reported that the cadets who completed the program graduated to work release and that the training and credentials earned through TRAMCON helped to "set them aside from someone who doesn't have [a credential]. They've been hired just for having that, even though they don't have any on-the-job training, they have OSHA 30 and get hired." Students in the Boot Camp program echoed these sentiments, reporting that they were interested in the TRAMCON program because, "it's a career starter, even if you don't want to do this in the future. This sets up a foundation that I can always use in life. Not everyone in construction has the certifications, so this helps us set a career path for ourselves."

One student from Polk who completed his TRAMCON training at PCI joined additional training programs in CNC machining at Polk upon his release and reported that he intended to enroll in the Engineering Technology degree program after that. This student reported that the TRAMCON program "really inspired me to continue to go back to school. This grant has made an impact on my life and made me what I am today."

Hands-On Learning

Across the consortium, grant staff and instructors at each college customized their lab spaces to enhance hands-on learning experiences for TRAMCON students. Instructors reported that they incorporated components from their experience working in the industry into their hands-on teaching. "Not everyone knows how to build a wall, but our guys do," explained one instructor. "We teach them things [from the textbooks] and then we do it, hands-on, all the materials we need are here." Instructors across the consortium reported working to have students in the lab as often as possible, with either full days in the lab, or a 60/40 split of lab and classroom time. Instructors across the consortium reported that they wished there was more time for hands-on learning in the TRAMCON program, since they felt that this is where students could "actually work on things."

Table 8. Uses of Lab Space and Equipment for Hands-on Learning

	Miami Dade	Polk	Santa Fe	Seminole
Unique Uses of Lab Space	Created a new lab that had all necessary equipment for TRAMCON	Brought equipment into PCI, hands-on lab equipment used by YouthBuild	Building of a house for Habitat for Humanity incorporated into lab time	Incorporated a tiny house, cabinet assembly station, and production line into the lab

Students and instructors across the consortium reported that the hands-on experiences provided through TRAMCON were one of the best parts of the program. "I like working with my hands," explained on student from Santa Fe. "We get a glimpse of everything," noted a student from Miami Dade, "I am excited to learn more, I love working in the labs." "You're learning while you're doing it," reported another student. A Seminole student reported wanting to have more lab time because "if we don't know what we're doing in the lab we're not able to understand [the materials] in the classroom." Students at Miami reported the benefit of having hands-on experience from the beginning of the program, which allowed students to become familiar with the tools and learn foundational skills in order to advance.

An employer from Miami reported the benefits of the hands-on experience that TRAMCON students earn, "These students learn the industry. If I have two candidates to interview for a job and one has been through TRAMCON, I know that they've had their safety training and earned their certifications, which are thorough. I also know that they've had time in the labs, and they will need less training [from me]." An employer partner from Seminole echoed that he was looking for candidates who "were familiar with the terms and conditions that they'd be working in; any real-life training." He noted that the TRAMCON hands-on training provided students with "a chance for people to learn something before they get onsite. It's very different to be on a job site than in a classroom"

Technology Enabled Learning

While the hands-on learning was reported as one of the most successful aspects of the program, grant staff across reported there was a lack of curriculum centered around the TLCs. The TLC equipment included the 3-D printers, routers, CNC equipment, and other equipment for experiential learning. Grant staff reported the TLCs included an exercise that required students to follow a blueprint using Legos. The Program Managers at Santa Fe reported that the curriculum included elements that centered around using the TLC to complete a project, but that there was "no lesson on each of the pieces." Instructors and grant staff reported some of the equipment, such as the 3D printer, was difficult to incorporate into the curriculum and with the traditional lab experiences.

Within the TLCs, there were opportunities to incorporate virtual reality and digital learning. Instructors reported using the Sketch-Up component during the first week of classes, but that it was difficult to find the time to fully incorporate it beyond the introduction at the beginning. While the Revit virtual reality component is used by the industry for 3D modeling, the Consortium Director and instructors reported that the program was "too complicated" and "seemed impossible" to use with a TRAMCON class, because it was too advanced for the Foundation students. Finally, curriculum design partners from UW-Stout created virtual reality simulations of a job site. Partners from UW-Stout reported that the simulations could be useful for recruiting, since they would allow potential students to have the "feel" of a job site. However, these components were not completed until after the performance period ended.

Across the consortium, grant staff and instructors incorporated enhanced technological instruction into labs and TLCs rather than through the hybridization of the TRAMCON curricula. Grant staff reported that while an online version of OSHA 30 exists, they were not able to offer it as part of the TRAMCON program. At Santa Fe, grant staff reported that in order to offer TRAMCON through a hybrid model, they would have had to use equipment from another campus,

and they were not confident that students would enroll in a hybrid course, since students had reported that the ability to learn from the instructors in class was important to them. Grant staff at Seminole reported that all of the TRAMCON curriculum is available to students on Canvas, and that students have the ability to access the materials outside of class. While the materials are available online, the courses are not offered in a traditional hybrid format where the instruction is offered through an online platform.

Articulation of Credit

Grant staff across the consortium worked with their institutions to determine the extent to which the non-credit bearing TRAMCON program would articulate into credit programs. The specific articulation agreements varied by institution, though at least one component of TRAMCON articulated at each institution. Additionally, MSSC CPT articulates statewide to three associate degrees, as part of the Florida Department of Education Statewide Career and Technical Education Articulation Agreements.[9]

Table 9. Articulation, by College

	Miami Dade	Polk	Santa Fe	Seminole
Articulation	Completion of Supervisor articulated the entire program into 16-17 credits in the Engineering or Architecture programs	Completion of MSSC CPT articulated into credits for the Engineering Technology degree program	NCCER credentials articulated into apprenticeship programs After Advanced, students can test for Technique credits in the Building Construction program	Completion of Supervisor articulated the entire program into 11 credits Completion of credentials in Foundation NCCER Core and OSHA articulated into credits

While not a credit-bearing pathway, staff at Santa Fe reported that many students enrolled in TRAMCON ultimately enrolled into one of the apprenticeship programs. "This grant has been beneficial for Santa Fe because it's feeding our other programs. People who wouldn't walk in the door for the apprenticeship program – because they don't know what trade they'd go into – now get a taste of everything first," explained Santa Fe's recruiter.

The curriculum developers from University of Florida (UF) reported that when the TRAMCON program was developed, the goal was for TRAMCON completers to have the ability to articulate their non-credit training into credits, earn their Associate Degrees, and then ultimately enroll in bachelor's degree programs related to construction management at the University of the Florida. The goal, as reported by the curriculum developers, was to provide students with a pathway forward, should they want to take advantage of it. "If you have energy and drive to continue on, we have a plan to adapt the program, that if people go into the field [after TRAMCON] they can come back to UF and get a construction management degree down the road."

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[9] For more information: http://www.fldoe.org/academics/career-adult-edu/career-technical-edu-agreements/industry-certification.stml#manu

Modifications of TRAMCON Curriculum and Program Delivery

Grant staff across the consortium reported challenges with the curriculum at the beginning of the program, due to relevancy of credentials, program materials, and the difficulty of some of the materials for students. According to one of the curriculum developers, TRAMCON was designed to be modified to meet "whatever the industry needs," including adding additional credentials that were not originally included in the program. Throughout the grant period, grant staff at the colleges modified the program offerings to better fit the needs of local industry, better fit students' abilities at various levels of the program, and to provide additional credentials to students to increase employability.

The curriculum designers reported that they anticipated varied implementation of the TRAMCON curricula from college to college, as "the labor force needs in each area would necessitate a differentiation of approaches to allow participants to gain employment upon completion." The curriculum designers acknowledged that industry in the areas surrounding each college varied from more construction focused to more manufacturing focused, and they reported the program was intentionally designed as to allow for flexibility amongst the consortium colleges.

In designing a program that could be flexible and customized to meet the industry needs of each area, the consortium adapted how they offered the program. For example, OSHA 30 was offered as a stand-alone class, allowing for incumbent workers who needed the training to earn the credential through the TRAMCON program. Additionally, the class structure (e.g., day and night programs, boot camp style) varied depending on college need, instructor capacity, and student schedules.

Throughout the course of the grant period, grant staff at all consortium colleges modified their programmatic offerings to best meet the needs of their students and local industry. Changes to the program were made throughout the grant period as needed, including content, delivery, and structure of the program. Changes to the program at a consortium and college level are described throughout this section of the report.

Specific Modifications

Throughout the grant period, grant staff made changes to the following components of the TRAMCON curricula: OSHA 10 and 30; MSSC CPT; NCCER Credentials; On-the-job training; and the Supervisor level. The changes made to each component, and the specific changes implemented at each college are discussed throughout this section.

OSHA 10 and OSHA 30

Original Implementation

The original TRAMCON curriculum design included OSHA 10 in the Foundation level and OSHA 30 offered during the Supervisor level. OSHA 10 and 30 both train for the prevention of safety and health hazards in workplaces, and on workers' rights, responsibilities of the employer, and the compliance process, however OSHA 30 is geared toward Supervisors and those with safety responsibilities.

Modifications Implemented

By the beginning of Year 3, across the consortium grant staff shifted the OSHA trainings, and offered primarily OSHA 30 in Foundation cohorts. Grant staff at Santa Fe offered OSHA 10 during

night Foundation cohorts, since the night classes were shorter than the day classes and the OSHA 10 training required less class time than OSHA 30. At all consortium colleges, OSHA 30 was offered as a standalone course to reach incumbent workers. Additionally, grant staff at Miami Dade offered OSHA 30 in Spanish and Creole to reach additional students as "the population down [in Miami] here demands it." Grant staff at Miami Dade reported moving OSHA 30 up to the beginning of the program gave students "an immediate bite and a tool to fix an employment issue or give them a raise. This gets them to enroll higher [in the program]."

Relevance of OSHA Credentials
Both instructors and employer partners across the consortium reported that employers value OSHA 30 more than OSHA 10, and that students would be more employable with OSHA 30. One employer reported "OSHA 30 is hard to come by; the training is expensive. A lot of employees have OSHA 10, so the OSHA 30 is huge [for TRAMCON students.]" Employers also reported that when a job candidate has an OSHA 30 card, it shows them the student is willing to make an effort towards their work, since the credential is not easy to earn.

MSSC CPT
Original Implementation
Across the consortium, grant staff and instructors reported that the Manufacturing Skill Standards Council's Certified Production Technician (MSSC CPT) certification was a challenge for students to complete, particularly when it was included in the Foundation level. Instructors reported the content was too difficult for a beginning student to learn, particularly the math components. An instructor at Santa Fe explained "the MSSC [CPT] is a higher level than they can do…it's not an easy test to pass and it's expensive."

Grant staff across the consortium reported challenges with the requiring students to pay for the MSSC CPT certification with their own funds, as many students did not have the ability to pay. Students at Miami Dade reported it was a challenge to pay for the test, and that while "it's not about getting it for free necessarily, but it has to be at a level you can afford, it's $180 for MSSC. If you have to retake it, you have to pay again." Students further explained that a sliding scale would have made the testing costs more accessible, or if the college was able to find a partnership to help reduce the burden on students. Miami Dade grant staff were able to secure additional funding to pay for student's MSSC CPT testing at the Homestead Campus, where students took the Safety and Quality modules during Foundation. Miami Dade grant staff did not require students to earn the credentials to progress through the next levels of the TRAMCON program.

Modifications Implemented
Due to the lack of relevancy with local employers, the difficulty of the materials for students, and the expense of testing, staff and instructors at each college in the consortium modified the way MSSC CPT was offered.

Table 10. MSSC CPT Delivery, by College

	Miami Dade	Polk	Santa Fe	Seminole
MSSC CPT Delivery Models	Students were not required to earn MSSC CPT credentials in order to progress through the program. MSSC CPT Safety and Quality modules were offered in Foundation level at the Homestead Campus. Student interest in determined if MSSC CPT was offered at the North Campus.	MSSC CPT was not included for the self-contained cohort at PCI. YouthBuild cohorts received MSSC CPT modules. Standalone MSSC CPT courses were offered at Polk's campus.	MSSC CPT modules were offered as standalone courses and completely removed from the Foundation level.	MSSC CPT was offered as a standalone course. MSSC CPT was offered at John E. Polk Correctional Facility if students passed TABE requirements.

Relevance of MSSC CPT Credential
Grant staff at Polk, Santa Fe, and Seminole reported that while MSSC CPT is recognized by employers throughout the state and provides employees valuable skills, it was not relevant for employers in their local areas. Instructors at Santa Fe reported "there's no demand for it. There might be value for it, but it isn't here." Grant staff at Polk reported the training related to the credential was valuable "because of the broad exposure and aspects they can understand for working in a factory…it gives them a better chance of finding employment outside of construction." However, the Program Manager reported "MSSC CPT is not a priority for employers here, it's not a prerequisite for getting a job." Interviewed students echoed the challenge of learning the materials, "for someone who has no knowledge of that stuff, it's really tough" but that it provides students "good knowledge of how to do things." One student reported the materials learned from MSSC CPT helped the student sustain employment because the student was able to apply "the quality control and how to maintain standard and requirements."

Grant staff at Miami Dade reported that the credential was more relevant for employers in the Homestead Campus area compared to the North Campus. Grant staff from Miami Dade reported that the areas served by each campus are distinct and that each campus served different populations, "they are very different in terms of student population and needs." Additionally, staff reported that there are different employers in each area. Instructors at Miami reported that "everyone knows it [MSSC CPT]. It is the most useful. It's hard for students to get, but it's worth it though."

NCCER Credentials

Original Implementation

As designed, the TRAMCON program included three NCCER credentials: NCCER Core, and NCCER Manufactured Construction Level I and II. NCCER Core is an existing NCCER credential which students earned during Foundation. TRAMCON stakeholders, including the University of Florida, worked with NCCER to develop the Manufactured Construction Level I and II credentials, which included tenets of existing NCCER trade credentials and were offered during Basic and Advanced.

Figure 3. NCCER Credential Components

Core	**Manufactured Construction** I	**Manufactured Construction** II
• Basic Safety • Communication Skills • Introduction to Construction Drawing	• Carpentry I • Plumbling I • Electrical Systems I (Partial)	• Electrical Systems I (Partial) • HVAC I • Plumbing II • Carpentry II
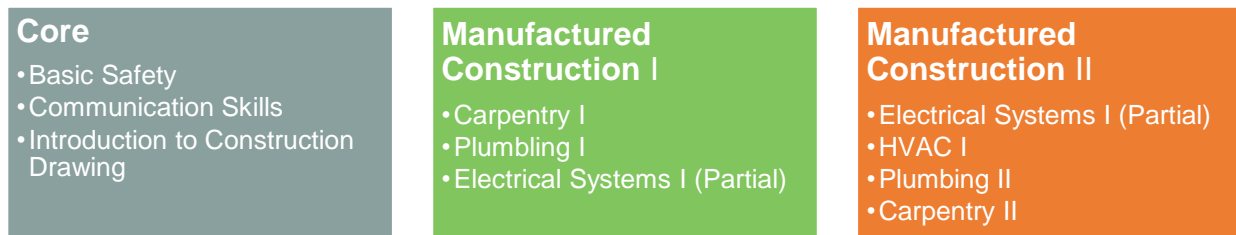
Modifications Implemented

During Year 3, the consortium received approval to add additional NCCER credentials into the curriculum following the Basic level: Carpentry, Cement finishing I & II, and Masonry I & II. Grant staff reported that adding three modules of Carpentry allowed students to earn an NCCER Carpentry I credential. Instructors at Miami Dade reported adding the Carpentry I credential allowed instructors to "go deeper" into the materials and in turn that added "more weight and power" to the students' experience.

Relevance of NCCER Credentials

Grant staff at three of the four consortium colleges reported that the local employers valued NCCER Core, particularly those in the construction industry. One Coach at Miami Dade reported that "NCCER [Core] wasn't that popular a few years ago, but now employers know about it" and the Program Manager reported "to be on a government job site, you have to have a certification." Grant staff at Santa Fe reported "some contractors are familiar with NCCER, especially in the trades. That's a good one to have" and that any employers that work with the college's apprenticeship program already are aware of the credential. Additionally, the instructor at Polk reported "some contractors won't bring employees on until they have an NCCER card" and that students with the NCCER Core training "can't help leaving the course and understanding the fundamentals and big picture." However, grant staff at Seminole reported that in the local area, "NCCER is irrelevant" and that "80% of contractors have never heard of them."

Two new NCCER credentials were developed for the purpose of the TRAMCON curriculum, Manufactured Construction Levels I and II. Grant staff reported that local employers were less likely to know and value the new NCCER credentials, compared to NCCER Core. Grant staff at Seminole reported that while the Manufactured Construction credentials were not well known, employers cared about the individual modules within the credential (e.g., electrical, carpentry, etc.). Additionally, grant staff at Santa Fe reported "I think if they knew what it was made up of, employers would appreciate" the NCCER Manufactured credentials, and that employers did not know what competencies were included in those credentials.

On-the-Job Training

Original Implementation
As designed, the TRAMCON program included 500 hours of on-the-job training (OJT) between Basic and Advanced levels and 500 hours of OJT between the Advanced and Supervisor levels. Grant staff across the consortium reported challenges with the OJT component of the curricula. Grant staff stated that the OJT was dependent on employers' interest and capacity to employ TRAMCON students, and that requiring students to competed OJT before both Advanced and Supervisor levels was precluding students from continuing their progression through the TRAMCON program.

Modifications Implemented
During the July 2016 quarterly consortium meeting, the consortium reached an agreement to flex the OJT component to require 1000 hours of OJT before students can matriculate into the Supervisor level. This change allowed students to progress to the Advanced level without completing 500 hours of OJT.

Supervisor Level

Modifications Implemented
At the end of PY 2, the curriculum developers modified the content of the Supervisor curriculum to replace the MSSC Green Production certificate with two NCCER credentials: Project Management and Sustainable Construction Supervisor. Additionally, the curriculum developers created a Green Production module to include in the Supervisor level. While these changes were implemented during the grant period, the changes were made before any students had reached the Supervisor level. These changes were different than the original plan for the Supervisor curriculum, but implementation did not change.

College-Specific Curriculum Modifications

In addition to the curriculum modifications described above, each consortium college changed parts of the TRAMCON curriculum to better fit the local industry needs and the needs of students. Changes include delivery models, additional credentials, and blended learning.

Table 11. Changes to Curriculum by College

	Miami Dade	Polk	Santa Fe	Seminole
Curriculum Modifications	Changed delivery timeline for OSHA 30 in Foundation. Added additional Carpentry and Masonry NCCER modules.	Incorporated components of NCCER Manufactured Construction Level I into Foundation at PCI	Added additional credentials for forklift and scissor lift Advanced offered at night as a hybrid self-study	Blended NCCER modules from Basic and Advanced to offer topics in sequence (e.g., all of electrical, all of carpentry, etc.)

Miami Dade – The Program Manager at Miami Dade, who served as an instructor during the first two years of the grant, realized while teaching TRAMCON that "people leave if they just get OSHA 30" during the first week of Foundation because students can seek employment after earning the credential. Grant staff reported that they wanted students to receive the Manufactured Construction curriculum prior to exiting the program, so they modified when OSHA 30 was offered during Foundation. Rather than offering OSHA 30 during the entire first week of the program,

grant staff reported modifying the program to have one day of OSHA 30 each week throughout the Foundation level. Grant staff perceived that this change increased students' retention through the first level. Instructors also incorporated NCCER Carpentry and Masonry modules.

Polk – Grant staff at Polk primarily served inmates at PCI and these students received a modified version of the Foundation level. Due to PCI regulations, grant staff at Polk could only bring in some of the tools needed for the curriculum, limiting the amount of the curriculum that could be offered, according to the Program Manager. Polk staff and instructors modified the Foundation level to include OSHA 30 and elements of NCCER Core and NCCER Manufactured Construction I. The Program Manager reported that this allowed grant staff to offer a portion of the Basic curriculum. On campus, grant staff offered a shortened version of Foundation, and modified versions for YouthBuild and Associated Builders and Contractors (ABC) apprenticeship cohorts.

Santa Fe – The curriculum at Santa Fe was modified to incorporate two additional credentials into the Foundation day classes - Forklift and Scissor lift. The lab at Santa Fe had the equipment and instructors could provide the training, and Program Managers reported that while some employers might require their own training for the equipment, "it gets [the students] to learn how to use it" and students could tell an employer they had the experience with the equipment. Due to the challenges of offering Advanced as a nighttime course, grant staff at Santa Fe altered the Advanced level to be a hybrid self-study model which allowed students to study the curriculum at their own pace off-site and return to the college for lab work and testing. Grant staff reported the self-study model presented challenges with student retention since students did not come campus to ask instructors questions or complete testing. Grant staff reported a small number of students completed the full Advanced level during the grant and that often Advanced students stopped communicating with grant staff, and grant staff perceived this was due to either a student's lack of interest in the program or a student obtained a job.

Seminole – After removing MSSC CPT from the Foundation level, grant staff at Seminole reported that the curriculum included one week of OSHA 30 and three weeks of NCCER Core as well as the TRAMCON manufactured construction curriculum. This allowed grant staff to offer a new cohort of Foundation every four weeks. Grant staff reported after delivery Basic twice, as it was originally designed, they found there to be an overlap of the content between the Basic and Advanced levels. As such, they decided to offer a hybrid 20-week Basic/Advanced curriculum. Instructors taught the Basic and Advanced modules together by topic, which allowed all modules to be delivered in a sequence, rather than students receiving the introductory levels in Basic, then receiving the advanced modules in Advanced. As the curricula for Basic and Advanced are modular in nature and the modules were not sequential, students were able to join the 20-week blended level cohort immediately after completing Foundation. Instructors cycled through the modules for carpentry (including the additional modules), plumbing, electrical, and HVAC modules for each topic, before moving on to the next focus area; regardless of the focus area offered when students joined Basic, after 20 weeks students would receive all levels of each area. However, the Program Manager at Seminole reported that most students were unable to complete all 20 weeks of the course which resulted in those students not earning the NCCER Manufactured Construction Level I or II credentials because they did not complete all modules. The Program Manager reported that not earning those credentials did not hinder student employment, as students could "pull their own transcript and show they got the modules" that they completed and that the employers reported valued the modules as much as the credentials themselves.

Student Support Services

Across the consortium, grant staff utilized existing college resources, local CareerSource offices, the Coaches, and other grant staff to provide support to TRAMCON students.

Recruitment of TRAMCON Students

Grant staff reported that when they recruited students they had to leverage multiple avenues, approaches, and partnerships to increase enrollment. Grant staff reported that they were able to modify recruitment strategies to better reach and connect with potential students in their area.

Grant staff across the consortium reported that recruiting for a new program in a new industry hindered early recruitment progress. Coaches at each consortium college reported a need to educate potential students on what TRAMCON was and how the program worked, which Coaches reported made recruitment more challenging. Grant staff across the consortium reported a need to recruit students based on the skills students would learn and the broad application of those skills, as there was not a strong manufactured construction industry in any of the college's regions. Additionally, grant staff reported without a natural industry partner, Coaches had to find other avenues for recruitment, including non-traditional partners.

Coaches across the consortium leveraged multiple recruiting strategies to increase program enrollment. Grant staff across the consortium reported some of the successful avenues for recruitment included career fairs, fliers, leveraging the credentials earned (e.g. OSHA 30), and word of mouth. By the end of PY 3, grant staff reported that word of mouth was the most successful and impactful tool for recruiting additional students. Each college's Coaches reported that they had to find their own style and methods that worked in their local area and with the target population. For example, coaches reported varying success with social media, as grant staff at Santa Fe reported it was one of the most successful tools for recruiting students, Polk grant staff could not control what messaging went out or the frequency with which information was shared, making social media less successful.

Grant staff at Polk reported recruiting with the grant outcomes in mind allowed grant staff to have a clear vision for recruitment strategies. The Program Manager at Polk reported grant staff focused on recruiting "the population that's placeable, since placement is the hardest goal to achieve," (i.e., unemployed prospective students) from the beginning of the grant, rather than incumbent works or other populations. Additionally, grant staff reported focusing on populations that had an incentive to find immediate employment, such as those staying in transitional housing. Grant staff reported those students were required to sustain employment as a condition of living in transitional housing.

Grant staff across the consortium were able to leverage relationships with community partners and employers to recruit students. Each college's partnerships provided assistance in different ways to the program, including referring students, hosting training sessions, and providing a pipeline of students. The table on the following page highlights the partnerships at each consortium college that assisted in a significant way with student recruitment according to grant staff. Partnerships are described in more detail in the Partner Engagement section.

Table 12. Recruitment Partners, by College

	Miami Dade	Polk	Santa Fe	Seminole
College-specific recruitment partners	Miami World Center Transitions, Inc.	Polk Correctional Institute YouthBuild Associated Builders and Contractors (ABC)	College's apprenticeship programs	Community organizations (e.g., Goodwill, churches)

TRAMCON students across the consortium reported a variety of reasons for enrolling in the program. The Coach at Polk reported that when talking to potential students "for all of them it's about a national certification" to help them find employment. At Santa Fe, grant staff reported enticing students on the "awesome, entry-level experience" and the skills that they could earn. For some students, the no-cost aspect of the program was the reason they reported for why they enrolled in the program stating, "since it's free, I might as well get the skills." Other students reported taking the classes because "it was an open opportunity to get hands on experience" and "I like working with my hands and want to build something someone else can enjoy." Lastly, some students reported the enrolled out of necessity, stating "I took the course because I needed a job."

Retention of TRAMCON Students

To support students while they were enrolled in the TRAMCON program, grant staff and instructors provided a variety of retention related supports.

Table 13. Retention Supports Provided, by College

	Miami Dade	Polk	Santa Fe	Seminole
KSAO Assessments	Administered KSAO in all classes	Administered KSAO in all classes, except for OSHA 30	Administered KSAO, instructors reported using feedback to adjust instructional approaches	Administered KSAO during orientation and at the end of the course
IBEST Contextualized Learning	IBEST was not incorporated into classes	IBEST was not incorporated into classes	IBEST was implemented until PhiCaps funding ended	IBEST was implemented in classes
Soft Skills	Instructors taught soft skills throughout classes	Created a PowerPoint training on soft skills, instructors taught soft skills throughout classes	Instructors taught soft skills throughout classes	Incorporated a time clock into the classroom, instructors taught soft skills throughout classes
Campus Student Services	Referred students to available services	Referred students to available services	Referred students to available services, most students did not take advantage	Referred students to camps services, most utilized math tutoring
Job Preparation	Resume and cover letter support and interview skills; donated clothes for interviews	Resume and cover letter support and interview skills	Resume/cover letter support; employability skills; interview prep	Resume/cover letter support; interview skills connect to CareerSource

The most utilized student supports reported across the consortium were related to providing soft skills and employability skills training. Grant staff at all colleges reported integrating soft skill training into the classroom. Grant staff at Polk reported leveraging existing Polk Career Development Services staff to help students work on resumes during class, presented an overview of soft skills. Instructors at Seminole reported that often students did not have the experience to know what to expect from a job site, for example, these instructors instituted a timeclock in the classroom, and students had to clock in. If students were late, the instructors reported, "I'd ask them why they were late and then tell them they would have been fired [if they were on the job.] I am strict with the students, this is a right to work state, they could be fired for any reason." Instructors across the consortium reported supporting students to understand the importance of saving money for the future, and investing, as well as how to interview.

Two of the four consortium colleges implemented Integrated Basic Education and Skills Training (IBEST) team teaching. Program Managers at Santa Fe reported they were able to leverage Phi Caps funding to support an IBEST instructor for a portion of the grant period, however IBEST instruction ended at the sunset of the Phi Caps grant. Instructors reported that TRAMCON students needed the extra support of the IBEST instructor and that "without IBEST, it's harder" to provide students the additional support they need. The Program Manager at Seminole reported she had "seen how powerful it can be to have another instructor as support" and Seminole utilized a part-time IBEST instructor for additional classroom support. The instructors at Seminole reported they liked having the IBEST instructor as he was able to help students without taking away from instructional time during class.

Coaches, Job Developers, and CareerSource representatives equipped students with job preparedness supports across the consortium. The Seminole CareerSource representative reported working with students to develop job specific cover letters and resumes. Miami Dade Coaches reported working with students on the career paths that students could take following TRAMCON and they created Individualized Learning Plans for some students outlining these plans. Additionally, Coaches reported they helped students write resumes, prep for interviews, and understand what to wear to an interview. If students did not have interview clothes, grant staff reported they found organizations in the community that could provide discounted or free professional clothes and referred students to these organizations.

Grant staff at all consortium colleges reported that students had access to all student services the college offered to any other students, and that student use of these services often varied. Grant staff at Santa Fe reported that while students were referred to the Disability Resource Center on campus, which provided testing assistance, many students did not take advantage of the resource. Grant staff at Seminole reported students would utilize the college math tutoring services and support from career development center.

Grant staff across the consortium reported that while they administered the KSAO pre/post tests, grant staff rarely used the resulting data. The KSAO, pre/post tests were designed at the beginning of the program, and the Consortium Director reported that students were intimidated by the length of the assessment. Grant staff at Miami, Santa Fe, and Seminole reported it was difficult to interpret the results due to the evolving program, and that the test did not change after colleges removed components from the various levels (e.g., removing MSSC CPT from

Foundation). Santa Fe grant staff reported the highest rate of usage, as the Data Specialist analyzed the data to assess the extent to which prior knowledge influenced student performance. Additionally, Santa Fe instructors reported using the data on a "case-by-case" bases to help with instruction. For example, the instructors knew one student had poor reading skills, but high determination and they were able to use his motivations to "get past some rough points" and help the student succeed. Grant staff at Miami and Polk reported administering the test but not receiving the resulting data, or not knowing how to use the data.

Placement of TRAMCON Students

Grant staff at consortium colleges provided students with assistance finding employment opportunities through Coaches, Job Developers, and CareerSource (workforce investment system). Job Developers and CareerSource representatives worked to connect students to available job opportunities. For example, the Job Developer at Santa Fe reported that she used a bulletin board outside of the TRAMCON classroom to post job opportunities. In order to build a relationship with students and better understand the career goals of students, the Santa Fe Job Developer worked individually with each student to establish a job or career plan. She reported that this allowed her to post more relevant jobs and send specific job opportunities directly to students.

Grant staff at Seminole were the only team successfully embedded a CareerSource partnership into their grant staffing structure. Staff at Seminole had a consistent presence from CareerSource as part of their grant team. This representative provided job readiness and placement supports for TRAMCON students, including connecting students seeking employment to employers. The CareerSource representative reported conducting regular outreach to local employers to identify open positions, then began connecting students to the opportunities. Grant staff at Miami Dade and Santa Fe originally established similar partnerships with their local CareerSource offices, however those partnerships did not result in meaningful engagement between the two organizations. "We thought CareerSource would be a huge partner to help us recruit, pay for testing and books, help with career fairs, and placement," explained the Program Manager at Miami Dade. Without a fruitful partnership with CareerSource, grant staff at Miami Dade and Santa Fe severed their contractual relationships and instead hired internal Job Developers to support placement efforts. Grant staff at Polk elected to not enter into a formal partnership with the local CareerSource office since CareerSource would not be providing unique services to TRAMCON students.

While grant staff assisted with placing students into employment opportunities throughout the grant, placement efforts were not a primary focus for grant staff until PY 3. During PY 1 and PY 2 Coaches across the consortium reported a heavy focus on recruitment and spreading the word about the new TRAMCON program. Job Developers were hired during PY 3, and grant staff across the consortium reported switching their focus from "recruitment to placement" as the grant progressed. "We made a shift at the end of Year Two," explained the Consortium Director, "because recruitment isn't the priority [right now], it's about retention and completion. All the colleges made the shift."

Grant staff across the consortium reported challenges knowing when students obtained employment. Grant staff reported frequent challenges in connecting with students after they completed their TRAMCON classes, particularly when they were only trained in OSHA 30 and did

not persist into the rest of the TRAMCON training. Grant staff across the consortium reported students who only completed one credential were the most challenging to follow up with, as building relationships with the students was difficult to accomplish in the short timeframe of the OSHA 30 training.

In an effort to obtain employment information from students who had left the program, grant staff at Seminole developed a student survey in an attempt to capture employment and wage information from students; however, grant staff reported a low survey response rate from program completers. Grant staff at Santa Fe and Polk required students to return to the college to obtain the industry recognized credentials (e.g. OSHA 30 card), providing grant staff an opportunity to follow up with students, face-to-face, on their employment status.

Partner Engagement

Throughout the grant period, TRAMCON grant staff engaged a variety of partners in the implementation of the program. Partners tended to fall into four main categories: four-year institution partners; local CareerSource offices; correctional institutions; and employers and industry partners.

Table 14. Partner Contributions

Partners	Program Design, Program Management, and Curriculum Development	Recruitment. Training, and Placement	Leveraging of Resources and Sustainability
Four Year Institutions: University of Florida; University of Wisconsin-Stout; Colorado State University	Partners designed TRAMCON curriculum, virtual reality components of curriculum, and KSAO assessment		
Employers & Industry Partners: Miami World Center, Palm Harbor Homes, QLM	Feedback on relevance of credentials assisted grant staff in modifying curriculum	Employers attended career fairs, advisory committees for related programs were updated on TRAMCON activities, and referred students to the program	Some partners contributed equipment to labs; Habitat for Humanity House at Santa Fe, Home Builders Assoc. is interested in the curriculum
CareerSource Offices: CareerSource Central Florida		CareerSource embedded a staff member into Seminole's grant staff team to assist with recruitment and placement	
Correctional Institutions: Polk Correctional Institute, Metro West Detention Center, John E. Polk Correctional Facility		Local correctional institutions allowed TRAMCON classes to be offered in their facilities	

Partners from three different four-year universities were involved in the design of the curriculum, the virtual reality components, and the development and analysis of the KSAO assessments. As appropriate, these partners participated in consortium meetings throughout the grant period and provided updates to grant staff on progress in these domains. These partners included: The M.E. Rinker Sr., School of Construction Management at the University of Florida, where the curriculum designer is a faculty member; Colorado State University's Department of Construction Management, whose faculty developed the pre/post assessments and conducted an analysis of the data; and the University of Wisconsin-Stout, Wisconsin's Polytechnic Institute (UW-Stout), whose faculty led efforts to integrate contextualized learning into the curriculum. Additionally, UW-Stout faculty developed the virtual reality models for students to learn how to open, manipulate, and view a 3D space. According to the curriculum designers, the other two university partners have been long-standing partners on other projects and were involved with the TRAMCON program from its development phase during grant writing.

Employers and partners were engaged in a variety of ways throughout the consortium. Feedback from employers supported the changes to the program offerings, and some employers attended career fairs and spoke to students in the TRAMCON programs about working in the local manufacturing or construction industries. However, while employers were engaged in different ways, as a whole, employer engagement in the TRAMCON program was reported by grant staff at all four colleges as a challenge. Grant staff at most consortium colleges reported the program had only a few employers who were engaged, and staff reported that these engaged employers were often engaged in only one of the activities. "We don't have the level of involvement that we wish we had," explained the Program Manager from Seminole.

Factors Contributing to or Hindering Partner Involvement

Grant staff leveraged community partners and projects to propel TRAMCON forward. Grant staff at both Polk and Miami Dade sought opportunities to expand the efforts of TRAMCON through engaging work that was already underway in their communities. In Miami, a large construction project – Miami World Center (MWC) – began during the grant period. In order to meet their obligations to the city, MWC had to hire a certain number of local workers for the project. Miami Dade grant staff forged a partnership with the company building MWC, and grant staff were able to build a pipeline of TRAMCON-trained workers who were then hired to work on the MWC project, thus meeting the builders' contractual obligations. "It's a win-win for us," explained the Program Manager at Miami Dade. Similarly, grant staff at Polk built partnerships with the local YouthBuild chapter and with the local Associated Builders and Contractors (ABC) chapter to provide training to their existing members, which allowed Polk to train more TRAMCON students, without having to recruit each student individually.

Lack of manufactured construction industry in the areas around each college and minimal recognition of credentials. Across the consortium, grant staff reported that there were not employers from the manufactured construction industry to partner with for the TRAMCON program. Grant staff from Santa Fe reported that "we have interest from more traditional companies, it really would have been beneficial to have 2-3 manufactured construction companies who were really involved."

Additionally, grant staff reported that using the credentials that TRAMCON students earned to try to raise interest among local employers was also challenging. Staff across the consortium

reported that MSSC CPT was not relevant to local employers, which is why they removed it from the Foundation level, likewise, consortium instructors noted that "no one knows the new manufactured construction NCCER credentials." The absence of a base of manufactured construction companies, or companies who valued all the credentials offered through the program, limited the engagement of employers across the consortium.

Design of TRAMCON was to move the industry forward, but the industry was not positioned for changes that started with entry-level workers. Instructors and grant staff reported that there was an inherent tension in the design of the program and the intentions of the TAACCCT funding opportunity. The curriculum designers reported that the goal of TRAMCON was "to make a seamless training from certifications, to AA degrees, to bachelor's degrees." However, program staff across the consortium reported "they [the curriculum developers] see the bigger picture of a new generation of construction. The industry changes are with them [curriculum development partners], they're the graduates with bachelor's and master's degrees. But this is a different training, people are coming here to get a job, not to change the industry." This sentiment was echoed by the outgoing Consortium Director, who reported "it is a tug of war between big industry change and employers who aren't there yet. Our students have skills that employers are not using." Instructors from Santa Fe concurred, reporting "I understand the higher thinking for the future of the industry, but our students need jobs now."

Most Impactful Partner Contribution to the TRAMCON Program

Three of the four consortium colleges successfully engaged local correctional institutions to bring TRAMCON training to soon-to-be released offenders. Staff at Polk, Miami Dade, and Seminole all reported offering training programs in local prison facilities. The Polk Correctional Institution was reported as the most impactful partner by grant staff at Polk, as "we've seen the most success and the most benefit there. We've made the most difference." As grant staff at Polk found success in partnering with PCI, grant staff at both Miami Dade and Seminole followed their lead and forged relationships with local correctional institutions to provide TRAMCON training to inmates. Grant staff at Seminole reported the relationship developed with the jail through TRAMCON will allow the college to do additional work with the jail in the future.

Least Impactful Partner Contribution to the TRAMCON Program

Partnerships with local CareerSource offices did not yield expected results. At the onset of the grant, partnerships with CareerSource offices were forged by grant staff at Miami Dade, Santa Fe, and Seminole. The Consortium Director reported, "If we had support from the beginning [from CareerSource], we would have had more participants and more employers. We needed their guidance on getting people ready for the workforce." Staff at Seminole successfully maintained a relationship with CareerSource and had a representative who was dedicated to the grant team to support job readiness and placement efforts. However, staff at Seminole experienced turnover in this position three times during the grant. Staff reported that even with a dedicated CareerSource representative on staff, students did not fully take advantage of the resources that could have been provided by CareerSource. "I don't think they wanted to sit down and make a job-specific resume and cover letter," explained staff at Seminole.

Program Output Achievement
Program Outputs

The TRAMCON consortium set a goal of serving 1,500 participants and having 900 program completers during the grant period, and the consortium more than doubled both of these outputs. Additionally, more than 3,800 credentials were earned through the TRAMCON program, more than triple the anticipated target. The TRAMCON Consortium exceeded the goals for six of the eight TAACCCT outputs, with only the number of students employed and participants retained in employment were the only outcomes not met. The Consortium Director reported that she anticipated the consortium likely met those outcomes, but due to the two-quarter delay in UI wage data, the consortium did not have access to up-to-date data on student employment status and earnings.

Figure 4. TAACCCT Output Achievement
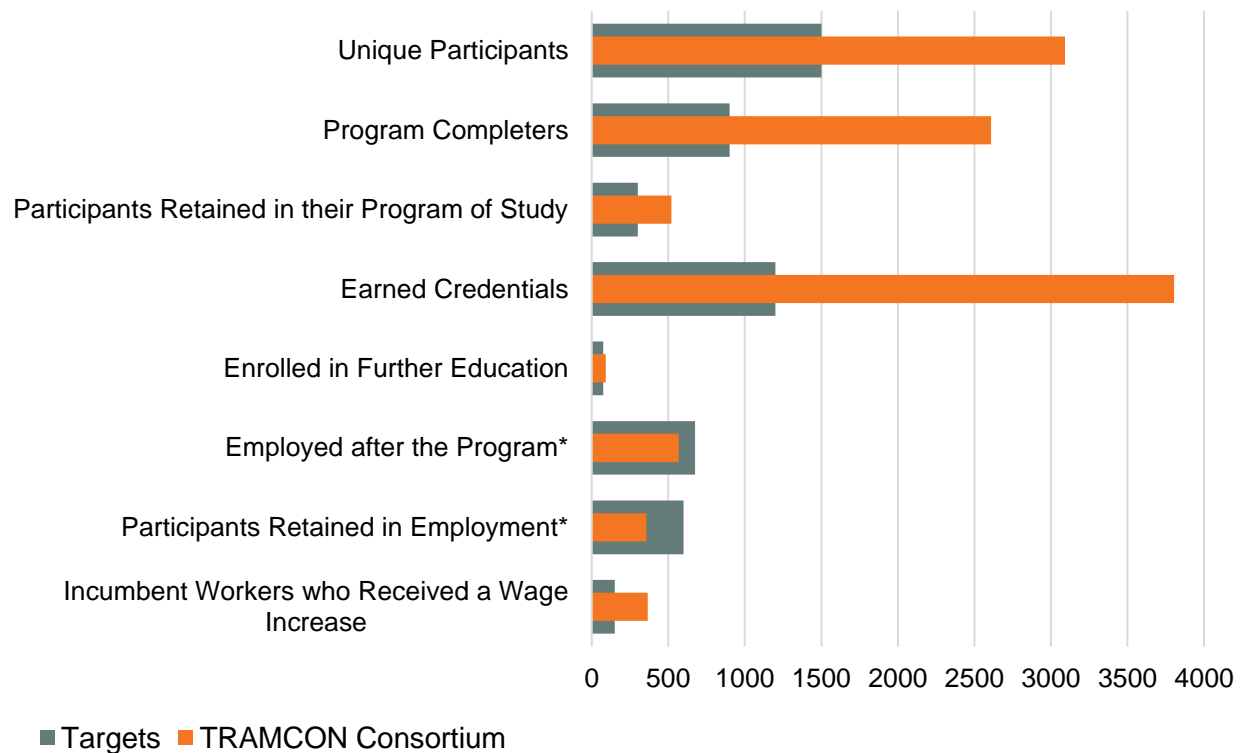
Accelerators of Output Achievement

Student satisfaction with the program across the consortium led to increased awareness of the program through word of mouth. Across the consortium, students in all levels of the TRAMCON program reported high levels of satisfaction with their experience. Students reported that the program provided valuable skills and training that could be translated to many industries and careers. Students preferred the lab time and reported that they "learn more [in the lab] rather than just sitting in the classroom having a lecture" and that "sometimes we don't understand very much in the classroom but he [the instructor] shows us how to do it and it's easy to understand and figure out." Students explained that using the tools allowed them to feel more comfortable in the lab environment. Students at Seminole reported that the teamwork aspect of the lab was beneficial, that they learned how to communicate together and operate as a team rather than individuals when working on the same task or project.

Students reported that having instructors who were knowledgeable in the industry made the program stronger, as instructors shared real-world advice and stories and teach tips and tricks that were not included in the materials. A student from Polk reported that he was "impressed with the amount of information" provided in the program and encouraged other students to not "take it for granted." One student at Santa Fe explained "TRAMCON is a way to get your foot in the door with what you want to do" and a student at Miami Dade reported "The different opportunities that we learn about and connections that the administration has are going to propel us to success."

Students reported that because of their satisfaction, they tried to recruit friends and family to join the program. One student reported "everyone I see that can benefit from the program I tell them to come." Additionally, interviewed students reported that they heard about TRAMCON from someone they knew who said they were in the program and really enjoyed it. Grant staff across the consortium reported that one of the strongest recruiting methods was a recommendation from a current or former student and through word of mouth in the community. Grant staff reported during PY 4 that the student enrollment had increased as the community had become more aware of the program and the word was spreading.

Grant staff at each consortium college were able to modify the curriculum to meet the needs of students and local industry. The curriculum developers reported that the curriculum is designed to be tailored to the industries and employers that colleges have in their area and that he and the Consortium Director agreed that if colleges "want to bring in other components, it's not a problem." College leadership at Polk reported that the ability to modify the levels "allowed classes to grow" and the Consortium Director reported "the ability to have a flexible curriculum was a big success." Instructors at Miami Dade reported that the building codes in different areas of the state vary and the ability to adapt the program to the area was important.

Allowing the curriculum to be flexible for each of the consortium colleges provided grant staff the opportunity to continually improve the program based on employer and student feedback. One partner organization explained "there is an open dialogue about classes" to offer students form the program between the organization leadership and grant staff, and further explained "they have assessments of what works and what doesn't." Grant staff across the consortium were able to incorporate additional modules or credentials into the program to provide students with additional skills before exiting the program. An instructor at Seminole reported that because of the flexibility "I've been able to bring in my talents and skills doing special things that they want to learn and encouraging their [the students'] creativity." Additionally, the instructor at Polk reported tailoring his instruction to each cohort of students, explaining, "you can glean from different classes where they want to go [in their careers] and you try to deliver a reasonably comprehensive program."

Changing MSSC CPT from required to optional provided grant staff across the consortium opportunities for increased hands-on time and stronger retention with students. Grant staff at each consortium college were able to offer MSSC in a way that best suited students in their area, as detailed in the Modifications of TRAMCON Curriculum and Program Delivery section. Grant staff reported that still offering MSSC CPT for students who were interested, but not requiring it or not requiring students to take the tests, increased student retention. Moving MSSC out of the Foundation level allowed grant staff to shorten the amount of time needed for students to complete the level. Santa Fe Program Managers reported after removing MSSC, Foundation

"gets close to three fourths of a semester, then students can start Basic during the same semester [as Foundation]," which grant staff perceived to help increase student retention. Additionally, instructors reported the change allowed for more hands-on instruction.

Grant staff across the consortium were able to engage local populations in non-traditional ways, increasing the reach of TRAMCON. Three of the four consortium colleges engaged with incarcerated populations by the end of the grant period. The Consortium Director reported that engaging with this population was one of the most notable successes of the grant, and that "the training gave them a second chance to find employment after they leave, so they may be less likely to return to incarceration." Grant staff at Polk reported that working with the students at PCI and "just being able to provide services for those students" was a success of the grant. Grant staff at these colleges reported that incarcerated students often had an incentive to obtain employment upon their release, due to transitional housing or probation requirements, which grant staff reported helped the consortium meeting project deliverables. Grant staff at Polk were also able to work with the YouthBuild program and ABC chapters, bringing the program to the potential students.

Barriers that Hindered Output Achievement

The lack of an established manufactured construction industry in the areas of the colleges hindered both employer engagement and job placements in the intended industry. Program Managers and instructors across the consortium reported that without an established manufactured construction industry, there were challenges in engaging employers in the program. Instructors reported that they tried to engaged employers from either the manufacturing or construction industries for the TRAMCON program, since there were no manufactured construction partners. Grant staff at Seminole reported that without a manufactured construction employer in the area, advisory boards for the TRAMCON program typically consisted of employers involved with other programs at the college and that the boards "piggybacked off of boards already in place because otherwise we were pulling from the same group of employers." At Santa Fe, grant staff reported "if we had industry here, we'd be able to show [the students] how those factories operated. It's really missing here."

However, the curriculum designers of TRAMCON reported that they viewed the manufactured construction industry "using the broader definition of anyone doing manufactured pieces – truss and pre-cast concrete, [for example] in the construction industry." Additionally, staff at Santa Fe noted, "the conventional construction industry wants our students. There's a shortage of labor, and if they [the students] have the training, it's a great thing."

Grant staff at consortium colleges often worked in silos, rather than as a consortium. Across the consortium, staff reported that while TRAMCON was a consortium of four colleges, staff did not learn from each other's experiences to improve their own programs as much as they could have. As a result of the customization of the curriculum to meet each college's needs, grant staff began to focus more on their differences and how each was uniquely implementing the program, as opposed to seeing the similarities. "We're all doing different things," noted grant staff across the consortium. Staff reported that it was hard to apply each other's best practices to their own situations. "We tried to share best practices," reported grant staff from Miami Dade, "but the colleges have such different rules."

The development, and subsequent rollout, of the curricular components created by partners did not meet expectations of grant staff. Staff across the consortium reported challenges with the components of the curriculum that were newly developed for the TRAMCON program (e.g., Manufactured Construction Levels I and II). For example, grant staff and instructors reported that as the first cohorts reached the second and third levels of the TRAMCON program, there were delays in the availability of the curriculum. When this occurred, grant staff reported that students spent more time in the labs, while waiting on the curriculum to be released. Additionally, instructors reported that they wished that the manufactured construction curriculum "was more in-depth…we expected the curriculum to have more complimentary hands-on components." Staff on the curriculum committee noted that when these components were not included in the provided curriculum, instructors added their own hands-on lessons. However, they reported, "if you want the curriculum to be transferrable and standardized, then we needed built-in hands-on experiences that were the same." Staff also reported that there was not a cohesive curriculum connected to the TLCs, and instructors reported that they utilized the TLC equipment in their labs but that "we have great equipment to work with [in the TLC], but no direction on how to best use it [within the curriculum].

The virtual reality simulations, a stated grant strategy, were not completed by partners at UW-Stout until after the grant performance period ended. During a presentation on how virtual reality component could be utilized, grant staff noted that the rollout of the virtual reality component was "too late for TRAMCON students to use." Staff also reported that the Revit and Sketch Up components that were implemented earlier in the grant were "beyond what these students were capable of," and the Consortium Director reported that "the schools weren't ready for the advanced technology…the program is too advanced for the students and the instructors" and therefore were not fully utilized in classrooms.

Instructors reported that due to the "free program," some students were less engaged that they had hoped. While students reported that the tuition free program was appealing and was one the things that interested them in the TRAMCON program, instructors and grant staff reported that there were challenges with the level of engagement from some of the students, since they had not invested financially in their education through TRAMCON. "A free program is a wonderful thing," explained a Seminole grant staff, "but it is difficult to get people invested in it." One instructor at Santa Fe reported that more restrictive admissions requirements may have resulted in students' having a stronger commitment to attending the program. He reported that while these are non-traditional students and instructors tried hard to support and accommodate their students, the lack of commitment from some students is "not fair to those who did show up to work. The free course makes it easy, there's not an investment in this for some of them." Students who were engaged in focus groups offered advice to incoming students, "don't take it [the program] for granted – there's a lot of information there and if you do it for the wrong reasons, you're wasting someone else's spot in the class…students have to be determined and have to make sacrifices for the class. Nothing comes for free, even though it's a free program."

Implementation Evaluation Conclusion

Grant staff across the consortium adapted the TRAMCON program to best fit the unique needs of each campus and community. Though these modifications resulted in implementation that was not completely aligned to the program model that was designed, the inherent flexibility in the design of the curriculum allowed for this customization in an intentional manner. Modifications to

which of the NCCER modules were offered, the extent to which MSSC CPT was offered, swapping OSHA 10 for OSHA 30 in Foundation and other curricular changes created a customized program that met the needs of local employers. By offering the TRAMCON program in correctional institutions, grant staff at three of the four consortium colleges were able to expand the reach of TRAMCON programming beyond the traditional non-credit college student population.

Across the consortium, both students and employers reported that the program provided students with the foundational skills and industry recognized credentials necessary to seek employment in the construction industry. Students reported the extensive hands-on training, use of technology enhanced equipment, and classes led by experienced instructors were the most beneficial aspects of the program. Students and grant staff also reported that the supports offered to students while in the program (e.g., soft skills, mock interviews, resume assistance, IBEST instruction) were key to their success. Grant staff also provided students with extensive placement services to prepare students for employment upon completion of their training through TRAMCON.

Despite a lack of a formal manufactured construction industry, grant staff across the consortium were able to engage employers and community partners to provide additional locations for TRAMCON trainings, recruit additional students, and provide opportunities for placement. Grant staff engaged partners from four-year institutions to provide guidance and development support for curricular components of the program. Employers were less engaged than grant staff had anticipated that they would be; however, those that were engaged provided support through feedback on the program, attending career fairs to support students' job searches, and hired program completers.

OUTCOMES EVALUATION

The Impact and Outcomes Evaluation began in August 2015 and continued through March 2018.[10] Throughout the course of implementation, the Evaluation Team found that the impact portion of the evaluation could not be performed, and the methodology would need to be adjusted from the initial evaluation plan, as no comparison group existed. As a result, no impact evaluation could not be performed, as there was no counterfactual.[11] Initially, the Evaluation Team envisioned that the evaluation would compare students in the treatment group with those who were enrolled in the equivalent programs prior to the innovation (i.e., retrospective comparison group). To accomplish this, the Evaluation Team initially proposed to identify a comparison group using a multi-stage procedure that would match treatment students with a pool of similar students from the consortium colleges who had not been exposed to the intervention and who had not selected not to be exposed to the intervention (TRAMCON programming).

The Evaluation Team determined that the identification of a comparison group was not feasible, as the new TRAMCON program was distinctly different from that of any credentialing programs across the consortium colleges. Per feedback from USDOL, the alternative design proposed included using only treatment-only group data within a short-interrupted time series (SITS)[12] approach to determine the efficacy of the TRAMCON program in improving wages for students enrolled in the program. The TRAMCON program was designed so that students could enter and exit the program after any level and grant staff at each college offered the non-credit training program on various schedules. Due to this flexibility of the program, there were numerous start and end dates for students across the consortium which could extend for variable amounts of time, and the Evaluation Team determined that SITS would not be applicable. SITS is commonly used for studies where there are much fewer entry and exit points for cohorts of students.

Instead, an outcomes-only evaluation was conducted on wage and credential completion outcomes. The data tracking software used for TRAMCON only tracked data on students who were program completers (those who completed at least one of the credentials in the program, other than OSHA 10[13]). Therefore, all data in the following section does not include all students that enrolled in TRAMCON, but rather only those who earned at least one TRAMCON credential: OSHA 30, NCCER Core, NCCER Manufactured Construction 1 & 2, MSSC CPT, and NCCER Project Management and Sustainable Construction Supervisor

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[10] TRAMCON grant implementation took place up to March 30, 2018. The period of April 1, 2018 through September 30, 2018 was additional time for evaluation analysis and reporting.

[11] Gertler, P.J., Martinez, S. Premand, P., Rawlings, L.B. & Vermeersch, C.M.J. (2011). *Impact Evaluation in Practice.* Washington DC: The International Bank for Reconstruction and Development/ The World Bank.

[12] Please reference Bloom, H.S. (2003). Using "short" interrupted time-series analysis to measure the impacts of whole-school reforms. *Evaluation Review, 27*(1), 3-49. Bloom, H.S. (1999, August). Estimating program impacts on student achievement using "short" interrupted time series. Paper presented at the American Educational Research Association meeting, Montreal, Canada.

[13] OSHA 10 did not count as a credential for a program complete, per USDOL guidelines.

Outcomes Methodology

The Outcomes Evaluation aimed to examine specific observed completion and employment effects that were associated with participation in TRAMCON. The goal of this evaluation was to understand the patterns in credential completion and post-program wages of students enrolled in TRAMCON.

Research Questions

The Outcomes Evaluation focused on two preliminary research questions that fall within the domains addressed by nine USDOL-required outcome measures. Since no comparison group was available, the evaluation design was adapted, and the evaluation questions changed accordingly.

1. How does completion of credentials differ by demographic, academic, or geographic subgroup?
   a. How does credential completion at each college compare to TRAMCON as a whole?
   b. What is the variation in students earning credentials?
2. To what extent did student mean post-program wages change?
   a. How do student wages differ by demographic, academic, or geographic subgroup?
   b. What is the variation in post-program wages?

Data Sources

Grant staff at each consortium college collected student data and entered the data into an Efforts to Outcome (ETO) database. Staff at Miami Dade, as the consortium lead, managed the database and served as the Evaluation Team's main point of contact for data. The Evaluation Team used a specific process for collecting the final dataset from the consortium. First, the Evaluation Team requested a representative test pull of consortium data for students enrolled in TRAMCON to examine what variables would be needed for the final dataset. Next, grant staff at Miami Dade linked all student IDs to Social Security Numbers (SSNs) and submitted the data to the Florida Department of Economic Opportunity (DEO), who provided all quarterly wage records associated with each of the student SSNs. Grant staff at Miami Dade removed the SSNs from the data file and merged the UI wage data with the original TRAMCON data file. Finally, grant staff at Miami Dade securely transmitted the de-identified dataset to the Evaluation Team, according to the data sharing agreement.

Following the final data transfer, data was cleaned and coded by the Evaluation Team, a full description of the data cleaning and coding process is available in Appendix C. All students in the dataset earned at least one credential, not including OSHA 10. No 2018 wage data was available for TRAMCON students, as UI Wage data availability was only available two quarters in arrears. The data used in this analysis ranged from Quarter 1 of 2015 to Quarter 4 of 2017 (quarters are calendar year quarters). Pre-program wages included all quarters before the student enrolled in the TRAMCON programs. Post-program wages included all quarters once the student completed their last credential in the TRAMCON program. Because of the variety of start and end dates, program start and end dates were categorized by quarter to parallel the wage data available. For example, if a student started a program in September of 2016, they would have a starting quarter of Quarter 3 of 2016.

The dataset used for the analyses of credentials was more robust than that used for the wage analyses, in that the dataset used for the analyses of credentials included more students, and as a result, more credentials. This was because the dataset with wages had to be pulled at an earlier

date to ensure that there was enough time to collect UI wage data from the Florida DEO, as well as to perform the additional complex cleaning and coding of wages to ensure that pre-and post-wage growth could be measured. Credential data was pulled again at a later date as grant staff reported there was a delay in receiving physical credentials for students, which resulted in credential data entry being delayed. The Evaluation Team requested a new dataset to ensure all available data on student credentials earned were included in the analyses.[14]

For the wage data, there were a number of outliers within the data set. The Evaluation Team examined the distribution of the wages to determine what would be an acceptable amount of wage data to trim. The wage data was trimmed from the bottom and top five percent, which was a suitable cut-off point compared to one or ten percent cut-off points. There was still enough variance in the wages so that the data was not greatly skewed, and statistical tests could be performed. The descriptive statistics for the trimmed wage data used for the analysis is included in Table 15. For the descriptive statistics for the untrimmed wage data, refer to Appendix C.

Table 15. Wages by Quarter (Pre-and Post-Program Combined) after Trimming

		# of Students with Wages Available	Minimum	Maximum	Mean	Median	Standard Deviation (SD)
2015	Q1	705	$253.00	$18,094.00	$6,590.77	$5,828.00	$4,377.02
	Q2	743	$414.00	$18,779.00	$6,801.08	$6,111.00	$4,585.09
	Q3	725	$340.00	$18,664.00	$6,883.61	$5,937.00	$4,578.90
	Q4	755	$448.00	$20,193.00	$7,371.50	$6,456.00	$5,062.98
2016	Q1	765	$329.00	$16,859.00	$6,759.53	$6,317.00	$4,369.03
	Q2	800	$346.00	$22,419.00	$7,438.77	$6,733.50	$5,259.29
	Q3	829	$443.00	$19,500.00	$7,714.54	$7,000.00	$4,928.41
	Q4	866	$409.00	$19,645.00	$7,450.09	$6,676.00	$4,845.37
2017	Q1	888	$341.00	$19,152.00	$7,347.86	$6,719.00	$4,874.28
	Q2	929	$437.00	$19,762.00	$7,596.34	$7,125.00	$4,862.99
	Q3	944	$448.00	$19,176.00	$7,721.94	$7,222.00	$4,940.15
	Q4	981	$573.00	$20,272.00	$8,128.81	$7,566.00	$5,069.70

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[14] The sample size for the wage analyses was 1,132. The sample size for the credential analyses was 2,234. As a reminder, these data files were composed of students who earned credentials only.

Analysis Methods

The Outcomes Evaluation was designed to examine to the extent to which students who enrolled in the TRAMCON program earned credentials and the relationship of earning these credentials on student post-program wages.

Figure 5. Data Sources and Analysis Methods

Data Sources
• Administrative data from Colleges
• Quarterly Wage data from DEO

Design
• Outcome analysis

Analysis Approaches
• Inferntial statistics, including t-test and General Linear Modeling (GLM) procedures
• Descriptive Statistics
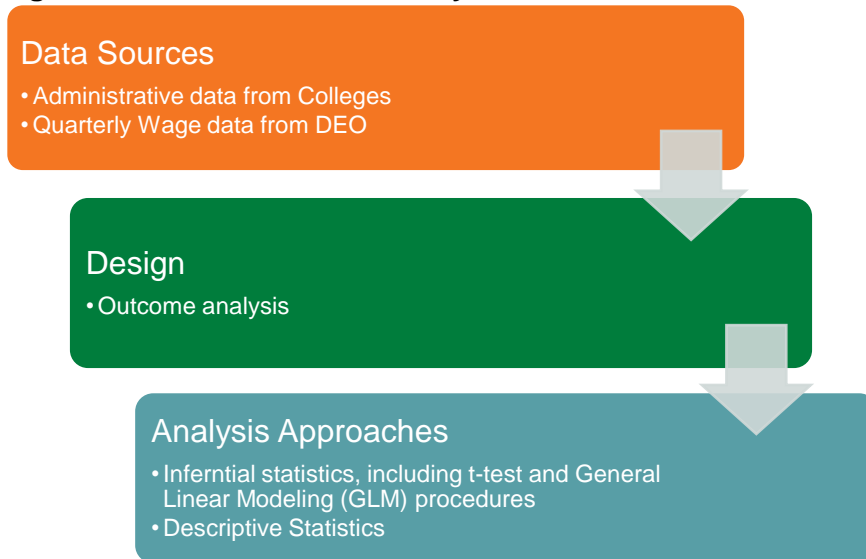
The Evaluation Team used analyses from the General Linear Model (GLM) family[15] to determine which characteristics can explain or predict student outcomes, when controlling for background factors, and the extent of these relationships. For this evaluation, the Evaluation Team specifically used multiple regression, which is within the GLM family. In addition, the Evaluation Team used another type of inferential statistics, paired t-tests, to determine if there was a significant change between pre-and post-program wages to answer Research Question 2. Additionally, the Evaluation Team computed descriptive statistics, which examined results disaggregated by college, highest level of education, and other relevant factors. Effect sizes were also computed, which helped substantiate any statistically significant results. IBM SPSS Statistics[16] was used for all statistical analyses, and G*Power[17] was used for power calculations.

Limitations

Limitations for the Outcomes Evaluation included the following concepts, grouped by main theme:

Data Considerations

Data Collected only on Program Completers – Data was only available on students who earned a credential that counted towards the USDOL outcome of a program completer. As a result, the Evaluation Team could not conduct any analysis to determine if there were

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[15] GLM is flexible, and relationships between two or more variables can be examined in the presence of multiple covariates. In GLM, one set of variables is predicted by another set of variables. Each variable added to the model can increase how well the original variables in the model are predicted. See Tabachnik, B.G., & Fidell, L.S. (2013). *Using Multivariate Statistics* (6th ed.). Boston, MA: Pearson.

[16] IBM Corp. (2018). IBM SPSS Statistics for Windows, Subscription Service. Armonk, NY: IBM Corp.

[17] Faul, F., Erdfelder, E., Buchner, A., & Lang, A.-G. (2009). Statistical power analyses using G*Power 3.1: Tests for correlation and regression analyses. *Behavior Research Methods, 41*, 1149-1160.

any patterns program persistence for students that did not earn credentials, or to determine completion rates for the levels of the program or the credentials themselves. Without data on the number enrolled and testing during each program period, this analysis could not be completed.

Lack of Comparison Group Data – Without a reasonable comparison group, the Evaluation Team could not conduct a more rigorous evaluation that compared the effects of the TRAMCON program on students' wage outcomes versus those of similar characteristics who did not enroll in the program.

Limited Wage Data – Due to the two-quarter delay in wage data, the Evaluation Team could not measure post-program wages for students who completed their credentials in the last five months of program implementation. As such, the Evaluation Team could not collect information to form a complete understanding of wages for those students who earned credentials later in the program. Moreover, though the wage data collected from the UI database was considered more reliable, data was skewed, with some completers earning very low (e.g., $1) or very high (e.g., $85,978.00) quarterly wages. These data were trimmed to address these outliers.

Limited Student Data – The data tracking system used throughout the consortium was designed to track students as they earned an industry-recognized credential during the program. However, as noted in the Implementation Evaluation, students did not always earn a credential after completing a level of the program. This likely resulted in the dataset not including students who completed a level of the TRAMCON program, or completed part of a level, but did not fully earn the associated credential. Additionally, the Supervisor level was not offered until the end of the implementation period, meaning there is no data on the number of students that earned the associated credentials.

Threats to Internal Validity

Claims of Causality – Because the Evaluation Team could not isolate all of the effects of TRAMCON through this outcomes-only design, the Evaluation Team *cannot make claims* that the TRAMCON program *alone* contributed to the outcomes reported for TRAMCON students.[18] As a result, the results presented in this report are more descriptive in nature and cannot be attributed solely to the TRAMCON program. Any inferences made from the statistical results should be taken with caution.

Historical effects – Historical effects occur when some alternative event or innovation happens concurrently with program implementation. This event might have some influence on the outcome variables, though the change is incorrectly attributed to the intervention. This is of particular concern because of the variability and influence that greater economic conditions have on the outcome of interest (i.e., wages). The availability of jobs changes over time; what may look like a program impact (or absence of one) could be entirely or partly the result of changing conditions outside the TRAMCON program. Since there was no external comparison group that is experiencing the counterfactual condition at the same time, the Evaluation Team cannot rule out the possibility that historical effects are influencing the outcome of interest.

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[18] Gertler, P.J., Martinez, S. Premand, P., Rawlings, L.B. & Vermeersch, C.M.J. (2011). *Impact Evaluation in Practice.* Washington DC: The International Bank for Reconstruction and Development/ The World Bank.

Selection Bias – The TRAMCON program was not designed for selective enrollment, or random assignment of students into the program, meaning selection bias inherently exists. Selection bias is common in any form of design that does not involve random sampling or random assignment. Selection bias in the enrollment process would distort inferences to the larger population.[19] Any time an evaluator does not randomly assign individuals, one runs the risk of systematic differences between groups due to selection bias. Thus, the Evaluation Team can only make inferences from this sample to the larger population of people that would have similar demographics, experiences, skills, and motivations to the participants in this evaluation.

Threats to External Validity

Unique Program Features and Timing – The duration of the program and length of the grant period may prevent the Evaluation Team from observing wage outcomes for a portion of the TRAMCON students, limiting the statistical power of the ability to detect effects. This may result in a type II error, in which the Evaluation Team incorrectly infers no impact when one exists (but may be too small to detect).

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[19] Gertler, P.J., Martinez, S. Premand, P., Rawlings, L.B. & Vermeersch, C.M.J. (2011). *Impact Evaluation in Practice.* Washington DC: The International Bank for Reconstruction and Development/ The World Bank.

TRAMCON Student Demographic Data

Across the consortium, there were more male students (83.5%) than female students that earned credentials. Due to the dataset only including students who earned credentials, no data is available on all students who enrolled in TRAMCON throughout the consortium. Polk had the lowest percentage of credential earners that were female; however, grant staff at Polk primarily offered TRAMCON at Polk Correctional Institute, which is a state prison for men.

Figure 6. Student Demographics by College

Gender[a]	TRAMCON Consortium	Miami Dade	Polk	Santa Fe	Seminole
Male	84%	81%	88%	83%	81%
Female	15%	18%	11%	15%	18%
Race					
White	44%	32%	42%	57%	56%
African American	33%	38%	36%	28%	23%
All other races	3%	2%	1%	5%	5%
More than one race	1%	1%	2%	0%	2%
Race unknown	19%	27%	19%	9%	14%
Ethnicity					
Hispanic	28%	56%	13%	10%	21%
Educational Attainment[b]					
HS Diploma/GED or Less	46%	40%	60%	46%	33%
Some College	12%	9%	11%	16%	15%
Credential	6%	3%	6%	8%	7%
Associate Degree or Higher	21%	24%	10%	22%	32%
Education level unknown	16%	24%	13%	9%	13%

Program completers varied by race and ethnicity at the four consortium colleges. Across the consortium, nearly three out of ten students were Hispanic, while at Miami Dade, nearly six out of ten students were Hispanic. More than half of students at Santa Fe and Seminole were White, compared to 31.6% at Miami Dade and 41.7% at Polk.

More than two-fifths of TRAMCON completers' highest level of education was a high school diploma or equivalent, or less, prior to enrolling in the program (46.0%). Additionally, one in five had earned an associate degree or higher. However, at Seminole, one third of students had earned a high school diploma equivalent or less (32.8%) before enrolling in TRAMCON programming, and nearly one-

[a] Missing includes Other category, as the number of students for this category was very small (n=2)
[b] Missing includes students who are currently attending school, so their highest level of education was not known

third of students earned an associate degree or higher before enrolling in programming (32.4%). Across the consortium, the mean age of TRAMCON students was 37.1, and students at Seminole had the highest average age, at 41.9.

Table 16. Mean Age of Students, by College

	TRAMCON Consortium (N= 2,234)	Miami Dade (N=686)	Polk (N=765)	Santa Fe (N=277)	Seminole (N=506)
Mean Age [a]	**37.1**	35.2	36.3	35.2	41.9

[a] There were 27 missing responses for the age category.

In addition, TRAMCON student demographics included:
- 91.1% of students were U.S. Citizens
- 7.9% of students were veterans across the consortium; 12.0% of Santa Fe students were veterans and 12.5% of Seminole students were veterans
- 1.7% of students reported having a disability

Key Outcomes Evaluation Findings

Credentials Earned

TRAMCON participants had the opportunity to earn up to seven industry recognized credentials if they completed all four levels of the TRAMCON program, including:

1. OSHA 30
2. NCCER Core
3. NCCER Manufactured Construction I
4. NCCER Manufactured Construction II
5. MSSC CPT
6. NCCER Project Management
7. NCCER Sustainable Construction Supervisor

Table 17. Percentage of Students Earning Credentials, by College

	TRAMCON Consortium (N= 2,234)	Miami Dade (N=686)	Polk (N=765)	Santa Fe (N=277)	Seminole (N=506)
1	**78.6%**	70.3%	82.9%	79.4%	83.2%
2	**16.5%**	15.9%	16.9%	16.2%	16.8%
3 or more	**4.9%**	13.8%	0.3%	4.3%	0.0%

More than three-fourths of students earned one credential through the TRAMCON program (78.6%). Between 15.9% and 16.9% of students earned two credentials across the consortium, and few students earned three or more credentials (0.0-13.8%). Students at Polk were the most likely to earn two credentials (16.9%), while Miami Dade students were the most likely to earn three or more credentials (13.8%). As discussed in the Implementation of TRAMCON Program section of this report, the Supervisor level was not offered at most of the consortium colleges due to delays in the curriculum, a lack of interest from students, and challenges meeting on-the-job training requirements. Additionally, grant staff across the consortium reported that students were

able to secure employment after completing Foundation, and sometimes after only earning the OSHA 30 card.

Table 18. Summary of Linear Regression Analysis for Variables Predicting Number of Credentials Completed Controlling for Selected Variables (N=2,234)[20]

	Chance there is a Difference (Stat. Significance)
Male [a]	**94.00%**
Hispanic [b]	**98.20%**
Age	**99.20%**
Veteran [c]	27.80%
Disabled [d]	55.50%
U.S. Citizen [e]	**99.99%**
Highest Level of Education [f]	89.80%

	$p \geq .10$
	$p < .10$
	$p < .05$
	$p < .01$

Students who were *not* U.S. Citizens and were older were more likely to earn more credentials. When controlling for other background characteristics (e.g., gender, ethnicity, etc.), student's age and citizenship status were significant factors in the number of credentials they earned. Additionally, there were also significant relationships between the number of credits earned and ethnicity (i.e., Hispanic), as well as the number of credits earned and gender (i.e., male), so female students and Hispanic students were more likely to earn more credentials than male students or non-Hispanic students. However, these relationships were not as strong as those of being a U.S. citizen and age. It should be a noted that though there is a substantial difference in the number of credentials earned between U.S. citizens and those who are not U.S. citizens, the sample size for those who are not U.S. citizens is quite small, compared to those who were U.S. citizens (199 vs. 2,029).[21] For full statistical results, refer to Appendix C.

Types of Credentials Earned

TRAMCON students were most likely to earn OSHA 30 and NCCER Core credentials (82.3% and 35.2%). Students at Santa Fe and Polk were least likely to earn OSHA 30; however, students at both colleges were most likely to earn NCCER Core. Grant staff Santa Fe offered OSHA 10 during evening courses rather than OSHA 30, due to time constraints, which was not tracked through ETO. Grant staff at Polk reported inmates at PCI could be required to miss the class or would be unable to attend, and if students missed portions of OSHA 30 students would not have an opportunity to make up for the missed training.

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[20] Coding for variables is as follows:
    [a] Coded as a binary variable, where male=1, all other genders=0
    [b] Coded as a binary variable, where Hispanic=1, not Hispanic=0
    [c] Coded as a binary variable, where veteran=1, not veteran=0
    [d] Coded as a binary variable, where disabled=1, not disabled=0
    [e] Coded as a binary variable, where U.S. citizen=1, not a US citizen=0
    [f] Coded as 1=HS Diploma/equivalent or less; 2=some college; 3=post-secondary vocational skills/credential; 4=college degree
[21] Average credentials earned for U.S. Citizen = 1.29; Not U.S. Citizen = 1.57

Table 19. Percentage of Students by Credential Earned and College

	TRAMCON Consortium (N= 2,234)	Miami Dade (N=686)	Polk (N=765)	Santa Fe (N=277)	Seminole (N=506)
OSHA 30	**82.3%**	91.5%	68.5%	67.5%	98.8%
MSSC CPT	**2.9%**	0.7%	6.5%	3.2%	0.0%
MSSC CPT Only	*0.9%*	*0.0%*	*2.5%*	*0.4%*	*0.0%*
Foundation: NCCER CORE	**35.2%**	36.2%	41.7%	46.2%	18.0%
Basic: NCCER MC I	**5.4%**	15.3%	0.0%	5.8%	0.0%
Advanced: NCCER MC II	**3.2%**	9.5%	0.0%	2.2%	0.0%
Supervisor: NCCER Project Management/Sustainable Construction Supervisor	**2.5%**	8.2%	0.0%	0.0%	0.0%

Few students earned the MSSC CPT credential (3.8%). As noted in the Implementation Evaluation, grant staff across the consortium reported that the MSSC CPT credential was not relevant in most areas and was too difficult for TRAMCON students, so grant staff at most colleges modified the Foundation level so that MSSC CPT was not required, and instead offered the MSSC CPT through a standalone course. Grant staff reported few students enrolled in the standalone MSSC CPT courses, and the data show that 2.9% of students earned the MSSC CPT credential and at least one other TRAMCON credential, with an additional 0.9% of students across the consortium earning only the MSSC CPT credential. Students at Polk were the most likely to earn MSSC CPT both as a standalone course and in addition to other credentials in the TRAMCON program.

Across the consortium, 5.4% of students earned NCCER Manufactured Construction I and 3.2% earned NCCER Manufactured Construction II. Only students at Miami Dade and Santa Fe earned the credentials in the Basic and Advanced levels. Grant staff reported that several more students completed some of the NCCER modules within the two manufactured construction credentials but did not complete all modules, and therefore could not earn the credentials. For example, grant staff at Seminole reported that due to the modified structure of Basic and Advanced, students often completed multiple modules within the two credentials, but not the full 20-week program (i.e., students would not complete all necessary modules for either credential). In other words, students would not complete all of the Level II NCCER modules (i.e., electrical, HVAC, plumbing, carpentry) necessary to earn the credential, but did complete, for example, all modules for electrical and HVAC.

Highest Level of Credential Earned

Table 20, on the following page, shows the highest credential TRAMCON students earned. Students who completed OSHA 30 and/or MSSC CPT but no other credentials from the program are categorized separately than those who persisted to earn the NCCER Core credential. While students who earned either credential were considered "program completers" these were separated as MSSC CPT was not required to persist through the program. Additionally, OSHA 30 was offered as a standalone course throughout the consortium. Therefore, students were categorized as completing the Foundation level if they earned the NCCER Core credential.

Across the consortium, 30.4% of students earned NCCER Core before exiting the program.
While some of these students may have received part of the curriculum from the higher levels of
the program, they did not earn the associated credentials. Grant staff at Polk did not offer levels
of the program beyond Foundation and grant staff at Seminole reported students often completed
parts of Basic and Advanced but were unable to earn all of the modules necessary for the
credential. Additionally, grant staff across the consortium offered standalone OSHA 30 courses
and standalone MSSC CPT courses.

Table 20. Highest Credential Earned by College

	TRAMCON Consortium (N= 2,234)	Miami Dade (N=686)	Polk (N=765)	Santa Fe (N=277)	Seminole (N=506)
Earned only OSHA 30 and/or MSSC CPT	**61.6%**	54.4%	58.3%	51.6%	82.0%
Foundation: NCCER CORE	**30.4%**	22.2%	41.7%	42.6%	18.0%
Basic: NCCER MC I	**4.7%**	14.0%	0.0%	3.6%	0.0%
Advanced: NCCER MC II	**0.7%**	1.3%	0.0%	2.2%	0.0%
Supervisor: NCCER Project Management/Sustainable Construction Supervisor	**2.5%**	8.2%	0.0%	0.0%	0.0%

Nearly 8.0% of students persisted to earn credentials beyond NCCER Core. Grant staff
across the consortium reported that retaining students through all levels of the program was
challenging due to students' ability to obtain employment after earning industry recognized
credentials. Students at Miami Dade were the most likely to earn credentials beyond the
Foundation level, with nearly one-fourth of students earning NCCER Manufactured Construction
Levels I or II, or NCCER Project Management/Sustainable Construction Supervisor. Interestingly,
students at Miami Dade who persisted beyond the Basic level were more likely to earn all the
credentials available, including NCCER Project Management/Sustainable Construction
Supervisor, rather than leave the program after Advanced.

Post-Program Wages
The dataset for the wage analysis included fewer students than the dataset used for the analysis
on earned credentials. Wage data was provided by Florida DEO in July 2018 which was prior to
grant staff at colleges receiving the physical credentials for all TRAMCON students, resulting in
fewer students included in the wage analysis.

**Overall, students who earned at least one credential through the TRAMCON program had
an increase in their average wages after earning their credential.** Throughout the grant
period, student post-program wages increased for the consortium as a whole. The figure on the
following page shows the mean wages pre-and post-program for all students for whom wage data
was available (N=1,132 pre-program; N=901 post-program). Student wages generally increased
across quarters, with a sharp rise for both pre- and post-program wages in Quarter 4 of 2016
(mean pre-program wage=$7,916.94; mean post-program wage=$9,408.14), followed by Quarter
1 of 2017 when wages decreased slightly (mean pre-program wage=$6,798.16; post-program
wage=$8,095.61). Overall, the difference between mean post-program wages and pre-program

wages in each quarter ranged from $1,045.82 and $2,280.17. This data and the figure below is only descriptive in nature and illustrates pre- and post-program wages before any statistical tests were performed to determine the relationships of wages to other types of factors, such as the students' prior education level. Results from the statistical tests are reported later in this section.

Figure 7. Mean Pre-and Post-Program Wages for All Students

Year & Quarter Student Enrolled (Excludes Q1-4 of 2018 Since No Wage Data in 2018)
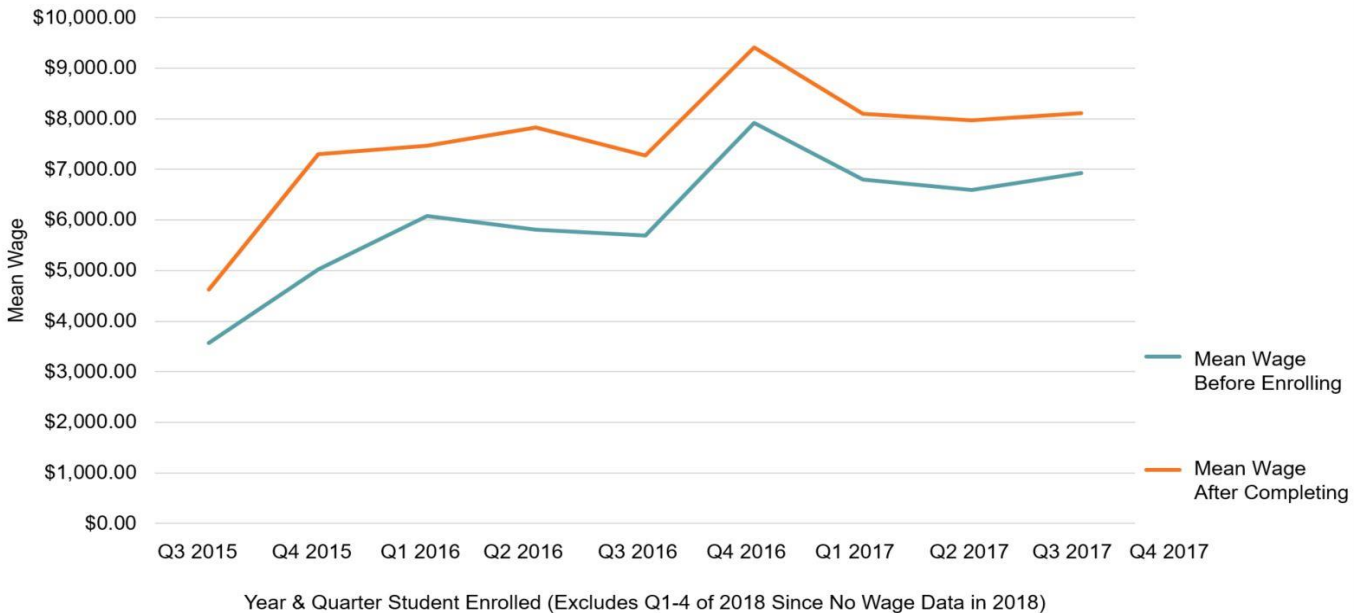
Students at almost all consortium colleges had an increase in their mean post-program wages. In total, post-program mean wages across the consortium were higher than pre-program mean wages by about $725.00. Students from Seminole had higher post-program wages compared to the consortium colleges; however, they also had higher levels of education before enrolling in TRAMCON programming than students at the other colleges, and higher pre-program wages. Students from Santa Fe had the greatest increase in their wages after program completion, with a mean increase of $1,160.20. On average, students at Polk had slightly (almost negligibly) lower post-program wages than pre-program wages. However, many of the students at Polk earned their credentials later in the program, so their post-program wages were not recorded. Additionally, the majority of TRAMCON students from Polk participated in the program at PCI, which could have influenced the types of jobs that the students were eligible to obtain.

Table 21. Mean Pre-and Post-Program Wages by College

	Pre-Program	Post-Program
TRAMCON Consortium (N=1,132/901)	**$6,327.16**	**$7,051.65**
Miami Dade (N=355/256)	$5,323.16	$6,561.97
Polk (N=245/238)	$5,982.38	$5,708.98
Santa Fe (N=173/113)	$4,939.32	$5,675.89
Seminole (N=359/294)	$8,224.07	$9,093.74

In Table 21, pre- and post-program wages for the consortium differ from those in Table 22 (Summary of Paired t-test Results for Pre-and Post-Program Wages) because only students who

had *both* pre- and post-program wages could be included in the statistical test in order to measure wage growth before and after their program.

As shown in the table below, **students earned significantly higher wages after program completion.** The difference between the pre- and post-program wages, more than a $1,470 increase, was statistically significant. To better understand the size of the difference, the effect size was computed. Effect sizes are useful for knowing if a statistically significant result is practically relevant. In education research, effect sizes of 0.30 are considered small, 0.50 are considered medium and 0.80 are considered large.[22] The effect size between the pre-and post-program wages for TRAMCON students was small (0.30), but not negligible. This means that that there was modest increase between pre- and post-program wages.

It is worth noting that this type of statistical test does not include any control variables or comparison group, so the results should be interpreted with caution, in that the effect of the program alone cannot be attributed solely to students' post-program wages. This analysis included only students who had both pre- and post-program wages, while the descriptive analysis reported previously in the section included the mean pre-and post-program wages for all students.

Table 22. Summary of Paired t-test Results for Pre-and Post-Program Wages (N=681)

	Mean	t-Statistic	Effect Size
Pre-Program Wages	$6,485.94	13.39*	0.30
Post-Program Wages	$7,956.58		

Note. The sample size is smaller for this analysis, as at least one quarter of both pre-and post-program wages was needed to be included in the analysis.
*p<.0.05

Students with higher levels of education had higher post-program wages than those with less prior education but made smaller gains from pre- to post-program. Students who had less prior education when they enrolled in TRAMCON made more gains in wages, in that their effect sizes (i.e., standardized difference) were somewhat larger than students with higher levels of prior education. The effect size between pre-and post-program wages was 0.23 for students with some college, though the difference was smaller for students with a high school diploma or equivalent or less (0.13). Though these are still relatively small effect sizes,[23] these results do show that there are notable changes in post-program wages based on levels of educational attainment.

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[22] Cohen's *d* (the effect size) is calculated by the change in the pre-and post-program wages divided by the pooled standard deviation for both pre-and post-program wages and can be thought of as a standardized difference. Effect sizes range from small (0.20), to medium (0.50) and large (0.80), see Cohen, J. (1988). Statistical power analysis for the behavioral sciences (2nd ed). Hillsdale. NJ: Lawrence Earlbaum Associates, 2.
[23] Effect sizes range from small (0.20), to medium (0.50) and large (0.80), see Cohen, J. (1988). Statistical power analysis for the behavioral sciences (2nd ed). Hillsdale. NJ: Lawrence Earlbaum Associates, 2.

Table 23. Pre- and Post-Program Wages by Prior Education Characteristics

	Pre-Program Wages (N=964)	Post-Program Wages (N=750)	Effect Size
High School Diploma or Equivalent or Less	$5,658.82	$6,251.30	0.13
Some College	$5,946.49	$6,908.83	0.23
Credential	$7,575.33	$8,293.52	0.15
Associate Degree or Higher	$8,755.98	$9,701.25	0.19

Note. Students with missing information about their highest level of education were not included

When controlling for background characteristics, pre-program wages and prior education were significant predictors for students' post-program wages. Results from the regression analysis showed that when controlling for other background factors, students with higher levels of prior education and those who earned more before program enrollment were more likely to have higher post-program wages than students with lower levels of prior education and lower pre-program wages. Please reference Appendix C for full statistical results.

Table 24. Summary of Linear Regression Analysis for Variables Predicting Mean Post-Program Wages Controlling for Selected Variables (N=901)[24]

	Chance there is a Difference (Statistical Significance)
Male [a]	86.40%
Hispanic [b]	51.30%
Age	25.00%
Veteran [c]	71.00%
Disabled [d]	63.20%
US Citizen [e]	24.30%
Highest Level of Education [f]	**99.90%**
Level of Credentials [g]	82.50%
Mean Pre-Program Wage	**99.99%**

	$p \geq .10$
	$p < .10$
	$p < .05$
	$p < .01$

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[24] Coding for variables is as follows:

[a] Coded as a binary variable, where male=1, all other genders=0

[b] Coded as a binary variable, where Hispanic=1, not Hispanic=0

[c] Coded as a binary variable, where veteran=1, not veteran=0

[d] Coded as a binary variable, where disabled=1, not disabled=0

[e] Coded as a binary variable, where US citizen=1, not a US citizen=0

[f] Coded as 1=HS Diploma/equivalent or less; 2=some college; 3=post-secondary vocational skills/credential; 4=college degree

[g] Coded as 1=Foundation (OSHA 30 or NCCER Core; 2=NCCER MC Level I; 3= NCCER MC Level II. MSSC CPT not part of the coding for this variable since it was standalone but was used for other analyses. Additionally, no data was included on NCCER Project Management/Sustainable Construction Supervisor credentials, so this was not included in the coding scheme.

Outcomes Evaluation Conclusion

Students that completed the TRAMCON program (i.e., those who earned at least one credential) earned an increase in wages from pre-program enrollment to post-program completion. When comparing only students who had wage data available both pre- and post-program, students earned more than $1,400 higher wages post-program, an increase that was statistically significant and practically relevant (as shown through the effect size). However, the analysis does *not* prove that the TRAMCON program alone contributed to wage gains for students, as the evaluation used an outcomes design with no control variables or comparison group. In further analyses on post-program wages, background factors, such as highest level of prior education and mean pre-program wages, were significant predictors in student's post-program wages. Students at almost every consortium college earned increased wages from pre- to post-program, with the exception of Polk students. However, TRAMCON programming at Polk was offered primarily through PCI which could factor into those student's employment opportunities. Additionally, students at Polk earned credentials later in the program, which limited available post-program wage data.

Of the TRAMCON students that earned credentials, more than three-quarters earned one credential, 16.5% earned two credentials, and nearly 5% earned three or more credentials. Student age and U.S. citizenship were significant factors in the number of credentials students earned, with older students and students who were not U.S. citizens earning more credentials. TRAMCON students were most likely to earn at least OSHA 30 and NCCER Core credentials, with 35.2% of students completing the Foundation level. Students were not likely to earn the credentials in the higher levels of the program, and grant staff reported students were not always required to test for the industry recognized credentials or did not complete all necessary modules. Slightly more than 5% of students earned NCCER Manufactured Construction I, and less than 4% earned NCCER Manufactured Construction II. The MSSC CPT curriculum was originally included in the Foundation level and students were required to earn the credential (i.e., pass all four modules) before matriculating into Basic. However, MSSC was modified to be an optional stand-alone course for most TRAMCON cohorts and passing the credential test was no longer required. As such, 3.1% of students earned the MSSC CPT credential along with an additional credential in the program.

While most TRAMCON students did not complete all levels of the program, they were able to earn, on average, significantly higher wages with the credentials they did earn through the program. Additionally, the number and level of credentials earned was not a significantly significant predictor of student's post-program wages. This finding could suggest that earning at least one of these in-demand credentials is beneficial for students.

LOOKING FORWARD
Program Sustainability

As noted throughout this report, the lack of a manufactured construction industry in the regions were the consortium colleges are located has resulted in leadership at most colleges electing not to offer the manufactured construction portions of the program. Grant staff at Seminole reported that they have submitted the TRAMCON curriculum for approval for a PSAV program. While the manufactured construction curriculum is not particularly relevant for the areas of the consortium colleges, grant staff at Santa Fe reported that the Modular Building Institute is interested in the curriculum of the TRAMCON program and is reviewing to determine the possibilities of scaling a manufactured construction training for their members across the country.

While staff reported that none of the consortium colleges will be sustaining the TRAMCON program in its entirety, grant staff at all colleges reported that components of the TRAMCON program would be offered in the future. Components that grant staff reported would continue to be utilized after the grant ends included: construction training, some of the industry recognized credentials, the lab spaces, and the equipment. However, grant staff across the consortium reported that without grant funding, future programming likely would not be free for students.

Table 25. Reported TRAMCON Components to be Sustained

	Miami Dade	Polk	Santa Fe	Seminole
Curriculum	Exploring a **construction training institute** that would incorporate portions of TRAMCON curriculum through continuing education programs **OSHA** 10 and 30, **NCCER** CORE, HVAC, carpentry, masonry, concrete finishing, electrical and plumbing **could all be offered** Considering options to **offset costs for students**	Coordinating with **high school construction academies** in the area to connect curriculum between academies and Polk's programs Offering **incumbent training** in NCCER pipefitting	Exploring opportunities with **two different school districts** to offer a pre-apprenticeship program or dual-enrollment program Students could take construction modules and **earn credit** towards a credit program or an apprenticeship	TRAMCON curriculum could be submitted for approval for **PSAV program offering** Offering **OSHA 30** as part of the AS Construction Management and BS Construction **degree programs** **MSSC** will be offered as an elective in both **degree programs** MSSC and OSHA 30 offered through **corporate college** Contracted with John E. Polk Correctional Facility to provide construction math, safety, and quality portions of NCCER CORE.

	Miami Dade	Polk	Santa Fe	Seminole
Equipment & Lab Space	Lab equipment and space could be used by the **construction institute**	Equipment and lab space can be used by **construction academies** that don't have labs yet Equipment and lab space can be used for **incumbent training programs**	Will continue to use the tools and equipment in the **existing lab space** Intentional decision during grant development to incorporate **building the Habitat house** into the lab time, so that it could be sustained after the grant	Welding program will use the **virtual welders** purchased through the grant Labs will be used for carpentry section of **General Maintenance PSAV** program **Maker Space** could eventually utilize the lab space as well as CNC router, laser cutter, gantry crane, AC/DC lab equipment, and all hand and power tools

Stakeholder Recommendations for Replication

If other institutions consider replicating the TRAMCON program, consider the following recommendations based on stakeholder feedback:

Identify the key manufacturing, construction, and manufactured construction industry partners and employers prior to implementing the program. Grant staff across the consortium reported that the lack of employer engagement and industry presence were two of the most notable challenges for both program implementation and student placement. Due to the flexibility in the curriculum, institutions could engage employers and stakeholders to identify the key credentials to include in the program. Establishing connections to employers and local organizations prior to program implementation could help with recruitment and job placement.

In addition to planning the relevant and appropriate curriculum modules, when implementing TRAMCON, grant staff reported a need to remain flexible during program implementation. The needs of employers and students can evolve over time and vary by geographic location. Grant staff reported the flexibility of the program allowed for regular program improvement and modifications based on needs of students by cohort and campus locations. Additionally, grant staff at three of the four colleges were able to modify the program to be offered at local correctional institutions (e.g., modified the program due to restraints on materials).

Grant staff across the consortium reported that many students likely could not have attended the program if there was an associated cost, in addition to assessment and textbook fees. Grant staff at consortium colleges reported wanting to find additional funding sources to continue the TRAMCON program, noting the fees of non-credit programs are often a barrier to non-traditional students. College Leadership at Polk reported offering the program as a credit program could be beneficial and "I can see all four phases [of TRAMCON] working well within a two-year degree format. They would have financial aid, could work part time" but as a non-credit program, students would not be able to afford a training of that length.

Across the consortium grant staff explained the need for a comprehensive data system prior to student enrollment, or at the beginning stages of enrollment. ETO was implemented early in the grant period and required multiple revisions in order to track grant outcomes. Data specialists at all consortium colleges reported having clear and consistent data tracking systems early on would have made the process more efficient and accurate. Grant staff noted the need for clear definitions of all outcomes and indicators prior to building the data system to reduce the need for modifications after data has been entered into the system. Additionally, grant staff recommended having dedicated staff to handle the data system and data entry at each institution.

The TRAMCON program includes a wide range of equipment and materials that need to be purchased for the hands-on and TLC components. Grant staff at one consortium college reported the need to work closely with procurement and accounting departments to ensure the correct equipment is purchased and is purchased with enough time to setup lab space prior to students beginning the program. Grant staff also recommended other institutions consider what equipment is needed for the aspects of the curriculum that are being implemented, as some pieces might not be as relevant for some industries.

CONCLUSIONS
Lasting Effects of the Grant

Qualitative and quantitative evidence suggests that TRAMCON students who earned credentials were able to secure higher wages after the program. Additionally, qualitative data suggests that due to the funding from USDOL, the TRAMCON program facilitated additional curricular offerings and expanded existing program offerings at consortium colleges, and aspects of the TRAMCON program are likely continue across the consortium.

The grant funding allowed consortium colleges to offer programs at non-traditional program sites and aided in the development of relationships with non-traditional community partners, including three correctional institutions and various re-entry programs. These relationships allowed grant staff to serve populations outside of the traditional non-credit college students and serve additional students through the program. At one consortium college, the funding provided an additional entry-point for existing pre-apprenticeship and apprenticeship programs at the college, providing students with foundational skills and experiences prior to advancing in programs.

The implementation of the TRAMCON program as designed varied across the consortium, as grant staff at each college modified delivery models and aspects of the program. Additionally, the final level of the program, Supervisor, was offered at one of consortium colleges. As such, the majority of TRAMCON students received a portion, but not all of the curriculum. Despite this, quantitative data show students that earned a credential secured significantly higher wages post-program.

Grant staff across the consortium anticipate opportunities to expand and modify TRAMCON curriculum offerings beyond the grant-funded initiative, such as coordination with local high schools, PSAV programs, the creation of a construction institute, and continued work with local correctional facilities.

Recommendations for Future Research

A review of evaluation findings and evaluation limitations suggests several avenues for future research. The Evaluation Team has identified four areas where further research may yield grater insight into the effects of the TRAMCON:

1. Implementing a quasi-experimental methodology to measure the impacts of the program;
2. The extent to which a longer post-program observational window would reveal impacts of greater magnitude;
3. Measuring the persistence and completion of TRAMCON students, and sub-groups of TRAMCON students;
4. Exploring the types of employment earned by students and the extent to which wages vary by industry.

The innovative nature of the program, and the varying start and end dates of program cohorts across the consortium limited the Evaluation Team's ability to identify a reasonable comparison group; therefore, the effects of the program on wages could not be attributed to TRAMCON alone. In order to further understand the effectiveness of the program on student outcomes, future research could include the study of the TRAMCON program which is implemented with defined start and end dates, or with a well-defined comparison group. This would allow future researches to determine the extent to which the TRAMCON program impacts credentials earned and employment and wage outcomes for students.

Extending the post-program observational period to examine outcomes beyond the first quarter following program completion would allow for a more complete data analysis. The extended post-program period would result in multiple benefits to the body of research, including an opportunity to explore the extent to which the effects of the TRAMCON program extended over a longer period of time. Additionally, as UI wage data is often in arrears, the extended period of post-program observation would allow researchers to examine the effects of the program on additional students, specifically those completing the program in the last six months of implementation. Likely, this would also include students completing the higher levels of the program, who might be prone to higher wage and employment gains, due to increased experience and credentials.

Student data was limited to those students who completed at least one credential through TRAMCON, and students were only tracked if and when they earned additional credentials. Due to this limitation, analysis was not conducted on the extent to which students persisted through each level of the program, or on completion rates of each level. Additionally, students who progressed through the program without earning industry credentials were not captured in the analysis. The collection and analysis of these outcomes in future research would allow further understanding of the impacts of the TRAMCON program.

Grant staff throughout the consortium reported that students were able to secure employment in a variety of industries, including construction, manufacturing, manufactured construction, and other fields. Future research on the industries in which students obtain employment would allow for additional analysis on the effectiveness of preparing students for the targeted industries and differences in wage outcomes. This would allow institutions to identify opportunities for additional employer partnerships and needs for focused career coaching and job development services and could allow TRAMCON implementers to further develop career pathways for students into the target industries.

APPENDICES

Appendix A: Implementation Evaluation Methodology

The Implementation Evaluation began August 2015 and continued through May 2018[25] to document program progress, to monitor program outcomes, and to provide recommendations for continuous improvement of program operations. During the evaluation, the Evaluation Team employed principles of a utilization-focused framework.[26] The substantiated assumptions[27] of utilization-focused evaluation are: (1) intended users are more likely to utilize evaluation findings if they understand and value the evaluation's processes; (2) intended users are more likely to understand and value the evaluation's process if they are engaged in evaluation decisions; (3) engaged intended users both enhance the credibility of evaluation findings and possess greater capacity for utilizing findings to improve the program; and (4) capacity for utilizing findings relies heavily on a collaborative, functional relationship between evaluators and intended users.

Additionally, the formative component of the Implementation Evaluation offered real-time feedback as the Training for Manufactured Construction (TRAMCON) program rolled out, through regular phone calls, quarterly summary reports, site visit rapid reports, and annual evaluation reports. This provided the Evaluation Team the opportunity to identify and share early evidence of strengths and areas for growth throughout the development of the program, as opposed to offering information only retrospectively.

Research Questions

Table A1 summarizes the research questions[28] examined through the Implementation Evaluation, including ties to data sources and analysis methods. Further details on data sources and collection plans, analysis methods, and potential limitations are detailed in subsequent sections.

Table A1: Implementation Evaluation Research Questions

Research Questions	Data Sources	Analysis Methods
1. How was the particular curriculum selected, used, and/or created?	• Implementation Update Calls • Program Site Visits • Document Review	• Document themes, interpret, and report on qualitative data provided by TRAMCON college staff and leadership, faculty, and participants, and curriculum designers
2. How were programs and program designs improved using grant funds? What delivery methods were offered? What was the program administrative structure? What support services and other services were offered?	• Implementation Update Calls • Program Site Visits	• Document themes, interpret, and report on qualitative data provided by TRAMCON college staff and leadership, faculty, and participants

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[25] TRAMCON grant implementation took place up to March 30, 2018. The period of April 1, 2018 through September 30, 2018 was additional time for evaluation analysis and reporting. The TRAMCON consortium received an extension for selective services that took place through July 31, 2018.

[26] Patton, M.Q. *Essentials of Utilization-focused Evaluation.* Thousand Oaks, CA. SAGE Publications, Inc., 2012.

[27] Brandon, P., N. Smith, C. Trenholm, and B. Devaney. (2010) *The Critical Importance of Stakeholder Relations in a National, Experimental Abstinence Education Evaluation.* American Journal of Evaluation, 31(4). 517–531.

Patton, M.Q. *Essentials of Utilization-focused Evaluation.* Thousand Oaks, CA. SAGE Publications, Inc., 2012.

Taut, S. (2008) *What Have We Learned about Stakeholder Involvement in Program Evaluation?* Studies in Education Evaluation. 34.

[28] Research Questions 1-4 were required by USDOL. Research Questions 5-9 were added by the Evaluation Team. The primary research question for Research Question 3 was added to capture a broader analysis approach, instead of Yes/No only responses.

Research Questions	Data Sources	Analysis Methods
3. How were assessment tools used to select participants for the grant program? Was an in-depth assessment of participants' abilities, skills, and interests conducted to select participants into the grant program? What assessment tools and processes were used? Who conducted the assessment? How were the assessment results used? Were the assessment results useful in determining the appropriate program and course sequence for participants? Was career guidance provided, and if so, through what methods?	• Implementation Update Calls • Program Site Visits • TRAMCON Consortium Meeting	• Document themes, interpret, and report on qualitative data provided by TRAMCON college staff and leadership, faculty, and participants, and four-year university partners
4. What contributions did each of the partners (i.e., employers, workforce system, other training providers and educators, philanthropic organizations, and others as applicable) make in terms of: (1) program design, (2) curriculum development, (3) recruitment, (4) training, (5) placement, (6) program management, (7) leveraging of resources, and (8) commitment to program sustainability? What factors contributed to partners' involvement or lack of involvement in the program? Which contributions from partners were most critical to the success of the grant program? Which contributions had less of an impact?	• Implementation Update Calls • Program Site Visits • TRAMCON Consortium Meeting	• Document themes, interpret, and report on qualitative data provided by TRAMCON college staff and leadership, faculty, and participants, and program partners
5. What program outputs have been generated to date? What barriers hindered output achievement? What factors unexpectedly improved output achievement? Why?	• Implementation Update Calls • Program Site Visits • TRAMCON Consortium Meeting • Program Documents	• Document themes, interpret, and report on qualitative data provided by TRAMCON college staff and leadership, faculty, and participants • Review all USDOL and TRAMCON internal program reports
6. How satisfied were program partners, staff, and participants with the program? Why?	• Implementation Update Calls • Program Site Visits	• Document themes, interpret, and report on qualitative data provided by TRAMCON college staff and leadership, faculty, and participants, and program partners
7. What have been the successes and obstacles to program performance?	• Implementation Update Calls • Program Site Visits	• Document themes, interpret, and report on qualitative data provided by TRAMCON college staff and leadership, faculty, and participants
8. How can program processes, tools, and/or systems be modified to improve performance?	• Implementation Update Calls • Program Site Visits	• Document themes, interpret, and report on qualitative data provided by TRAMCON college staff and leadership, faculty, and participants, and program partners

Research Questions	Data Sources	Analysis Methods
9. How can the program expand or enhance institutional capacity? What are the most promising programmatic components to use institution-wide? Why?	• Implementation Update Calls • Program Site Visits • TRAMCON Consortium Meeting	• Document themes, interpret, and report on qualitative data provided by TRAMCON college staff and leadership, faculty, and participants, and program partners

Data Sources and Collection

Data for the Implementation Evaluation was collected from the following data sources:[29]

- Implementation Update Calls
- Program Documents
- TRAMCON Consortium Meeting
- Program Site Visits including interviews and focus groups with key stakeholders

Implementation Update Calls

The Evaluation Team held regular calls (monthly in 2015 and 2016, and quarterly calls in subsequent years) with Program Managers and relevant staff at each consortium college, and with the TRAMCON Consortium Director, and other staff, as appropriate. The primary function of these calls was that they allowed grant staff to provide the Evaluation Team with timely information regarding TRAMCON program processes, progress, obstacles, and successes. These findings were elaborated upon during site visit interviews and focus groups, but calls provided grant staff with an opportunity to recall events and challenges more frequently than the site visits. The Evaluation Team compiled notes from these calls and provided the TRAMCON Consortium Director with a quarterly summary report based on the calls and any documents reviewed. This summary was distributed to others across the consortium colleges needed, and feedback was provided to the Evaluation Team to ensure an accurate understanding of grant progress was being captured. These notes are stored on Thomas P. Miller & Associates' servers and provided a timeline of relevant occurrences used as a reference point for site visit interviews and focus groups, and reporting.

An additional role of the implementation calls was to support administrative and data-related functions. Regular correspondence through calls and emails assisted the Evaluation Team with evaluation-related scheduling, IRB document submissions, and updates on data sharing and access. Data calls were also scheduled to discuss quantitative analysis methodology and to review the most recent TRAMCON timelines for enrollment and completion data. The Evaluation Team maintained ongoing communication with the TRAMCON Data & Finance Specialist and Data Entry Clerk through the life of the grant.

Implementation calls with TRAMCON staff took place throughout the grant implementation period. When USDOL granted the consortium a six-month grant implementation extension, the Evaluation Team expanded qualitative data collection to include calls during the extension period (October 1, 2017 – March 31, 2018) and expanded feedback on data collected to include calls in

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[29] The project launch meeting, a data source identified in the Evaluation Plan submitted to USDOL, took place at the start of the grant period. Since TRAMCON was still very early on in development, the project launch meeting served to better clarify understandings of the evaluation for TRAMCON leadership and staff and to better identify approaches the Evaluation Team could use to provide real-time feedback and information to consortium colleges, rather than answer research questions.

the evaluation reporting period (beginning April 1, 2018). Face-to-face meetings substituted for the implementation calls when the Evaluation Team conducted evaluation site visits.

Program Documents

The Evaluation Team reviewed program documents received from TRAMCON leadership, including:

- Quarterly Narrative Progress Reports (QNPRs) created by Miami Dade to USDOL
- Annual Performance Report (APR) Table 1s created by Miami Dade to USDOL
- TRAMCON promotional and descriptive materials (e.g. brochures, marketing materials)

These documents provided additional context and information to evaluate program implementation. Context from these documents informed questions for the implementation calls and site visits and informed content within the evaluation reports.

TRAMCON Consortium Meeting

The Evaluation Team attended the in-person May 2018 TRAMCON consortium meeting at Polk State College, which occurred after the performance period. The Evaluation Team participated in the meeting through sharing evaluation updates, including reminders of the quantitative data reporting timeline and Final Evaluation Report process, and gathering additional qualitative data. Through semi-structured group facilitation, the Evaluation Team gathered data from each consortium college on best practices, student success stories, and sustainability updates. Additionally, participating in the consortium meeting allowed the Evaluation Team to conduct a data validity check.

Program Site Visits

The Evaluation Team conducted two in-person site visits, in March 2016 and 2017. The first site visits focused primarily on program start-up activities, progress, successes, and challenges with TRAMCON implementation. The second site visit, in March 2017, focused on themes and issues that had emerged throughout the three years of implementation, program sustainability, lessons learned, as well as curriculum modifications, and successes and challenges of TRAMCON implementation.

During the site visits, the Evaluation Team conducted interviews and small focus groups using customized interview facilitation guides developed for each visit. Facilitation guides were developed for each stakeholder group (e.g., Program Managers, instructors, program participants) to ensure relevance of questions. Interviews and focus groups were semi-structured with a majority of questions being open-ended and probing, coupled with conversational inquiry. In line with the principles of applied thematic research, this facilitation approach allowed interviewees and focus group participants to speak about experiences in their own words, free of the constraints imposed by fixed-response questions. Inductive probing allowed the Evaluation Team to clarify statements, meanings, and feelings associated with experiences. This promoted evaluator accuracy in capturing detailed observational notes and evaluator learning from participant's word-choice and descriptions.[30]

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[30] Guest, Greg, MacQueen, K.M., and Namey, E.E. *Applied Thematic Analysis*. Thousand Oaks, CA. SAGE Publications, Inc., 2011.

The Evaluation Team received tours of and conducted interviews at Polk State College, Seminole State College, Santa Fe College, and the North and Homestead campus locations of Miami Dade College. The evaluators also conducted phone interviews when participants were unable to meet in-person. Stakeholder groups that participated in the site visits are outlined in Table A2.

Table A2: Implementation Evaluation Stakeholders

Stakeholder	Description
TRAMCON Consortium Director	The Evaluation Team conducted semi-structured 90- to 120-minute interviews with the TRAMCON Consortium Director at each site visit. These interviews focused on program activities and integration, collaboration between colleges, sustainability, program partnerships, resources, lessons learned, and sustainability from a consortium perspective.
TRAMCON Staff[31]	Semi-structured 30- to 120-minute interviews or small focus groups were held with the TRAMCON staff at each consortium college, including Program Managers, Recruitment, Retention, and Completion Coaches, Program Specialist, Outcomes & Data Specialists, Program Assistant, Program Coordinator, and CareerSource Representative (at Seminole). Interviews took place with all of the TRAMCON staff who were at the consortium colleges during the time of the visits and focused on implementation, challenges, successes, and lessons learned.
TRAMCON Instructors	Semi-structured 30- to 60-minute individual interviews and focus groups were held with full-time and part-time TRAMCON instructors during each of the site visits. These interviews focused on progress, challenges, successes, and recommendations for strengthening the program.
TRAMCON Participants	The Evaluation Team held semi-structured 30- to 60-minute interviews and focus groups with grant participants. When possible, participant focus groups. Discussions focused on individuals' goals, program experience, and overall program feedback.
Employers and Partners	Semi-structured 30- to 60-minute interviews were held with consortium college's local employers and program partners. Program partners included local community and non-profit organizations engaged with the program through recruitment and placement assistance. Discussions focused on program engagement, anticipated impacts to the business/organization, anticipated impacts to program participants and overall satisfaction.
College Leadership	The Evaluation Team conducted semi-structured 30- to 60-minute interviews with consortium college leadership. These interviews focused on program activities and integration, resources, lessons learned, and sustainability.

To increase consistency of the interviews, the Project Lead was present for all site visits and participated in phone interviews, implementation calls, program document reviews, and report writing. This consistency helped build and preserve institutional knowledge across site visits. In addition, at least two Evaluation Team members were present for each site visit; this allowed one member of the Evaluation Team to focus on facilitation and a second member to take detailed notes. These site visit methods are consistent with recommendations made by qualitative researchers.[32]

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[31] Job Developers were hired by consortium colleges following the final site visit in March 2017 and were not included in any on-site qualitative data collection.
[32] Kidd, P.S. & Parshall, M.B. (2000). *Getting the focus and the group: enhancing analytical rigor in focus group research*. Qualitative Health Research, 10(3), 293-308.

Analysis Methods

To conduct a descriptive analysis of program implementation and the contextual factors influencing implementation, the qualitative data generated from interviews was placed into a matrix that listed responses by interview question (row) and college/program role (column). Program roles included grant staff, grant instructors, consortium leadership, college staff, and students. Based on participant responses, key words were identified and listed in the appropriate column and row. Key words were then grouped across colleges, programs, and roles to identify commonalities and differences. Further, responses associated with key words were identified as positive, negative, or neutral to assist in identifying perceived successes and challenges.

Once groupings were identified based on review of interview data, the Evaluation Team augmented the information with a review of (1) notes taken during monthly (later quarterly) implementation update calls; (2) detailed notes taken during site visits (conducted during March 2016 and 2017), including direct quotes; (3) TRAMCON documents, including quarterly reports; and (4) the Team's extensive experience with technical training programs and the body of evaluation knowledge built through their work. Guidance about what was important came from the grant narrative, research questions, and calls that had occurred throughout the grant period. Following this initial theme development, additional Evaluation Team members reviewed the results, adding contextual details and examples. These themes were divided into the following categories:

- *Progress* – Documentable steps that had been taken to advance or achieve grant outcomes, deliverables, milestones, and/or goals**;**
- *Accelerators/Strengths of Progress* – Documentable achievements along with contextual factors that enhanced grant progress and improved the ability of grant staff to carry out grant initiatives, focused on internal factors (program design, modification, implementation, and application);
- *Barriers/Challenges to Progress* – Documentable shortcomings in achievements, along with contextual factors that hindered grant progress and delayed or prevented grant staff from carrying out grant initiatives;
- *Recommendations* – Opportunities the Evaluation Team identified for improving progress toward grant outcomes (in Interim Reports), and recommendations for other educational institutions looking to start similar programs; and
- *Sustainability* – Components of the program that are planned to continue once funding ends.

The results were again compared to the analytic frame and the anticipated reporting elements. The final step in the analysis was to send the summarized results to the Consortium Director who personally reviewed the report and followed up with key stakeholders, such as current and former TRAMCON staff and faculty, to fact check and gather additional contextual details.

To strengthen the accuracy and credibility of Implementation Evaluation findings, the Evaluation Team relied on triangulation, including reviewing outcomes data and identifying the ways in which it corroborated or conflicted with information from the Implementation Evaluation, and collaborative inquiry. By comparing findings based on different data sources and using approaches that incorporated both evidence and negative evidence, the Evaluation Team created

a robust and dynamic depiction of implementation.[33] By presenting findings to TRAMCON stakeholders for elaboration, corroboration, and modification, the Evaluation Team confirmed and updated analyses. Additionally, by sharing findings with intended users as they emerged, the Evaluation Team built a collaborative relationship with stakeholders that encouraged higher quality first-person data and increased the likelihood the evaluation could produce timely, user-relevant findings.[34]

Reporting of Results

Data were interpreted, analyzed, and included in (1) quarterly summary reports completed throughout the grant implementation period; (2) site visit rapid reports (April 2016 and 2017); (3) annual evaluation reports (September 2015 and 2017); (4) interim evaluation report (September 2016), and (5) this final report, finalized by September 30, 2018. The reports contain the results of the analysis and recommendations for program enhancements (interim report only), and lessons learned. An in-depth review of these reports was conducted by the Consortium Director and grant staff for member checking, factual verification, and elaboration on findings and recommendations. Subsequently, the reports were submitted to the USDOL by the TRAMCON Consortium Director. Quarterly reports were developed throughout the implementation period, providing programmatic updates and data on specific concepts.

Limitations

Limitations for the Implementation Evaluation included the following main elements, as well as the steps that were taken to mitigate the limitations:

Limited Data Sources – When possible, the Evaluation Team used data triangulation to verify narratives and other information shared by key stakeholders. Triangulating data from multiple sources, such as comparing findings among stakeholder interviews with outputs and outcomes data, creates more credible evaluation results. However, the Evaluation Team often was faced with a limited number of data sources. The Consortium Director and grant staff provided a majority of information to the Evaluation Team, and the evaluators were unable to triangulate some of this information due to a lack of other sources, including missing or incomplete data.

Partial and Biased Findings – Qualitative and perceptual research methods offer good insights, but are, by nature, partial and biased. For this evaluation, perceptual information (data gathered through focus groups and interviews with staff, stakeholders, and participants) was the primary mechanism by which information was obtained to gauge successes and challenges of the project. The Evaluation Team was faced with a limited number of additional data sources (quantitative and qualitative) to support these findings. To attempt to address this limitation, the Evaluation Team used data triangulation whenever possible, including interviewing multiple stakeholders.

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[33] Brewer, J. and A. Hunter. *Foundations of Multimethod Research: Synthesizing Styles.* Thousand Oaks, CA: Sage, 2006.
[34] Cousins, J.B. and Earl, L. M. (1992) *The Case for Participatory Evaluation.* Educational Evaluation and Policy Analysis, 14(4), 397-418.
Cousins, J.B. and Whitmore, E. (1998) *Framing participatory evaluation.* New Directors for Evaluation, 80. 5-23.
Greene, J. G. (1998) *Stakeholder participation and utilization in program evaluation.* Evaluation Review, 12. 91-116.
Reineke, R. A. (1991). Stakeholder involvement in evaluation: Suggestions for practice. American Journal of Evaluation, 12, 39-44.
Sturges, K.M. (2013). *Building consensus in (not so) hostile territory: Applying anthropology to strategic planning.* Practicing Anthropology, 35, 1: 35-39.

Respondent Order Effect – During site visits, the Evaluation Team conducted group interviews for students within the chosen classes. At these group interviews, participants more interested in sharing their opinions of the program may have spoken up at a greater rate than other students. This may have created a pecking order bias by participants self-selecting their response order (i.e. certain participants go first, and others go last). Receiving a range of feedback from participants, from positive to critical, supports the notion that a spectrum of student experiences was captured; however, it is possible that bias related to the participant response ordering was introduced into the evaluation.

Researcher Extrapolation – Analysis conducted with an interpretive analytical framework suffers from the threat that researcher extrapolation and interpretation may go too far beyond what is present in, and supported by, data.[35] Indeed, the recommendations provided in this report are based on a combination of what was learned and supported by data and the experiences and findings of the evaluators' previous experience designing, implementing, and evaluating various workforce development programs.

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[35] Guest, Greg, MacQueen, K.M., and Namey, E.E. *Applied Thematic Analysis*. Thousand Oaks, CA. SAGE Publications, Inc., 2011.

Appendix B: Program Site Visit Facilitation Guides

The following sections include the discussion questions for each stakeholder group during the program site visits. Participants were provided a consent form, including permission to audio-record interviews and focus groups. During focus groups, if any participants did not consent to audio-recordings, then conversations were not recorded. All interviews and focus groups began with brief introductions, including the purpose of the interview or focus group, the role of the Evaluation Team, and any other necessary details.

Consortium Director Interview Guide

Looking Back Discussion

1. How has program delivery changed over the duration of the TRAMCON grant?
   o What changed, and when?
   o Why did these changes need to occur?
2. Looking back on the grant as a whole, what were the most notable successes? Why?
3. What do you feel were the most notable challenges? (i.e., what do you wish would have gone better?)
   o How were these challenges addressed?
   o What has been the impact of staff turnover?
4. What do you wish you would have known from the beginning of the grant? (I.e., what are some lessons that you learned from this grant process?)
   o What resources were you lacking that would have helped improve the TRAMCON program?
5. In what ways, if any, has the consortium made progress on grant strategies?
   o *Strategy 1* – KSAO
   o *Strategy 2* – National standards-based career pathway opportunities for workers
   o *Strategy 3* – Contextualized learning (IBEST)
   o *Strategy 4* – Interactive virtual reality
   o *Strategy 5* - Enhanced coaching and student-employer mentorship for program retention
   o *Strategy 6* - transformative learning technology
6. How do you think TRAMCON grant has affected each college?
   o How do you think that the grant has affected institution capacity building?
7. On a scale of 1-10, with one being not at all, to what extent do you feel the program adequately prepares students for employment/ better pay? Please explain your rating.
8. How would you rate the success of the TRAMCON program on a 10-point scale?
   o Why are you rating each as such?
9. Overall, how satisfied are you with the TRAMCON programs? Why?

Partners and Relationships Discussion

10. How were the partners from UF, University of Colorado, and UW-Stout involved throughout the program?
11. How were all partners engaged throughout the program?
12. Who would you consider to be the consortium's most influential partners and in what way(s) have they been involved in grant activities? *(Specific employers, workforce system, specific philanthropic organizations, educators, etc.)*
13. Who would you consider to be the least influential and why?

Looking Forward Discussion

14. What elements of the TRAMCON program do you believe will be sustained beyond the grant?
    o Are there components that you feel *should* be sustained and why?
    o Tell me about any program elements that you feel should be scaled-up (i.e. expanded beyond the courses TAACCCT funded).
    o Tell me about any program elements that you feel were less beneficial and should not be scaled-up.
15. Looking to the remainder of the grant, what kinds of activities do you plan to accomplish with the time left?
16. Any additional thoughts about the TRAMCON grant, in general?

Project Manager Facilitation Guide
Changes to the Plan Discussion
1. Tell me about the staffing structure for the TRAMCON grant at (college).
    o # of staff, roles, FTEs
    o Tell me about any changes that have occurred to your staffing structure over time.
2. Tell me about the extent to which program delivery matches the original plan.
    o What changed, and when?
    o Why did these changes need to occur?
3. What articulates from the TRAMCON programs into credit programs?
4. What hybrid courses are you offering? Are there any additional courses that you plan to offer?

Looking Back Discussion
5. Looking back on the grant as a whole, what were the most notable successes? Why?
6. What would you say were the most notable challenges? (i.e., what do you wish would have gone better?)
    o How were these challenges addressed?
7. What do you wish you would have known from the beginning of the grant? (I.e., what are some lessons that you learned from this grant process?)
8. How to you think TRAMCON grant has affected the (college)?
    o How do you think that the grant has affected institution capacity building?
9. In what ways, if any, has (college) made progress on grant strategies?
    o *Strategy 1* – KSAO
    o *Strategy 2* – National standards-based career pathway opportunities for workers
    o *Strategy 3* – Contextualized learning (IBEST)
    o *Strategy 4* – Interactive virtual reality
    o *Strategy 5* - Enhanced coaching and student-employer mentorship for program retention
    o *Strategy 6* - Transformative learning technology
10. How would you rate the success of the TRAMCON program on a 10-point scale?
    o Why are you rating each as such?
11. On a scale of 1-10, with one being not at all, to what extent do you feel the program adequately prepares students for employment/ better pay? Please explain your rating.
12. Overall, how satisfied are you with the TRAMCON programs? Why?
    o How satisfied are you with supports you received for implementing the grant?

Partners and Relationships

13. How were partners engaged throughout the program?
    - o Who would you consider to be the college's most influential partner and in what way(s) have they been involved in grant activities? *(Specific employers, workforce system, specific philanthropic organizations, educators, etc.)*
    - o Who would you consider to be the least influential and why?
14. Tell me what you have heard from employer partners about TRAMCON completers.
15. What kind of feedback have you received from employers about the credentials earned?
    - o How relevant do the employers feel the credentials are?

Looking Forward Discussion
16. What elements of the TRAMCON program do you believe will be sustained beyond the grant?
    - o Are there components that you feel *should* be sustained and why?
    - o Tell me about any program elements that you feel should be scaled-up (i.e. expanded beyond the courses TAACCCT funded).
    - o Tell me about any program elements that you feel were less beneficial and should not be scaled-up.
17. Looking to the remainder of the grant, what kinds of activities do you plan to accomplish with the time left?
18. Any additional thoughts about your TRAMCON program or the TRAMCON grant in general?

Outcomes and Data Specialist Facilitation Guide
Looking Back Discussion
1. How has your role changed over the course of the grant?
2. Looking back on the grant as a whole, what were the most notable successes? Why?
3. What would you say were the most notable challenges? (i.e., what do you wish would have gone better?)
    - o How were these challenges addressed?
4. What do you wish you would have known from the beginning of the grant? (i.e., what are some lessons that you learned from this grant process?)
    - o Would you have used ETO given the chance? Why or why not?
5. How to you think TRAMCON grant has affected the (college)?
    - o How do you think that the grant has affected institution capacity building?
6. How would you rate the success of the TRAMCON program on a 10-point scale?
    - o Why are you rating each as such?
7. Overall, how satisfied are you with the TRAMCON programs? Why?

Program Implementation Discussion
8. Which element of the TRAMCON program do you feel is most important/really drives positive student outcomes?
    - o Which elements do you think were the least effective in driving student outcomes?

Looking Forward Discussion
9. Which elements of the TRAMCON programs do you believe will be sustained beyond the grant?
    - o Are there are components that you feel *should* be sustained and why?

10. Looking to the remainder of the grant, what kinds of activities do you plan to accomplish with the time left?
11. Any additional thoughts about your TRAMCON program or the TRAMCON grant in general?

Retention, Recruitment, and Completion Coach Facilitation Guide
Looking Back Discussion
1. How has your role changed over the course of the grant?
2. Looking back on the grant as a whole, what were the most notable successes? Why?
3. What would you say were the most notable challenges? (i.e., what do you wish would have gone better?)
   o How were these challenges addressed?
4. What do you wish you would have known from the beginning of the grant? (I.e., what are some lessons that you learned from this grant process?)
5. How to you think TRAMCON grant has affected the (college)?
   o How do you think that the grant has affected institution capacity building?
6. How would you rate the success of each program on a 10-point scale?
   o Why are you rating each as such?
7. Overall, how satisfied are you with the TRAMCON programs? Why?

Program Implementation Discussion
Student Supports
8. Which of the supports that you offer to students tend to be the most utilized? Which are the least utilized?
9. What are the challenges that students have faced while participating in the TRAMCON program?
   o How do these challenges affect retention and completion?

Job Placement and Readiness
10. What were the primary job readiness services that you offered to students? What went well? What didn't go well?
    o What was most impactful for getting participants employed, in your opinion?
11. What were the primary job placement supports? What went well? What didn't go well?
    o What was most impactful for getting participants employed, in your opinion?
12. How were partners actually engaged throughout the program for recruitment and/or placement purposes?
    o How did you build these partnerships?
    o Who would you consider to be the college's most influential partner and in what way(s) have they been involved in grant activities? *(Specific employers, workforce system, specific philanthropic organizations, educators, etc.)*
    o Who would you consider to be the least influential and why?
13. Tell me what you have heard from employer partners about TRAMCON completers.
14. What kind of feedback have you received from employers about the credentials earned?
    o How relevant do the employers feel the credentials are?
15. What were the major challenges and barriers to connecting students to employment? Specifically, in terms of job readiness, and job placement
16. On a scale of 1 to 10, with one being not at all, do you find that TRAMCON participants are ready for the job market? Please explain your rating.

Looking Forward Discussion
17. Which elements of the TRAMCON programs do you believe will be sustained beyond the grant?
    o Are there are components that you feel *should* be sustained and why?
18. Looking to the remainder of the grant, what kinds of activities do you plan to accomplish with the time left?
19. Any additional thoughts about your TRAMCON program or the TRAMCON grant in general?

Instructors and/or Faculty Facilitation Guide
Looking Back Discussion
1. What has been your experience to date with the rollout of the TRAMCON programs?
    o Have you experienced any challenges? Please describe.
    o Have you experienced any surprises? Please describe.
2. What do you like about the program?
    o On a scale of 1-10, how would you rate the curriculum/equipment/program? Why are you rating that way?
3. What, if anything, would you change?
4. Looking back, how closely do the programs in place reflect your understanding of the grant plan?
5. Overall, how satisfied are you with the TRAMCON programs? Why?

Program Implementation Discussion
6. What are the challenges that students have faced with participating in the TRAMCON program?
7. How are employer partners involved in your programs?
    o How did you build these partnerships?
    o Who would you consider to be the college's most influential partner and in what way(s) have they been involved in grant activities? *(Specific employers, workforce system, specific philanthropic organizations, educators, etc.)*
    o Who would you consider to be the least influential and why?
8. Tell me what you have heard from employer partners about TRAMCON completers.
9. What kind of feedback have you received from employers about the credentials earned?
    o How relevant do the employers feel the credentials are?
10. On a scale of 1-10, with one being not at all, to what extent do you feel the program adequately prepares students for employment/ better pay? Please explain your rating.
    o To what extent, do you feel that the credentials that students earn are relevant for the job market in the area?
    o What, if any, other courses, assessments, or credentials do you think could have led to better outcomes or could better prepare students for the job markets?

Looking Forward Discussion
11. Going forward, what changes do you plan to make to program delivery?
12. What elements/programs do you believe will be sustained beyond the grant?
    o Are there are components that you feel *should* be sustained and why?
13. Any additional thoughts about your TRAMCON program or the TRAMCON grant in general?

CareerSource Representative Facilitation Guide
Looking Back Discussion
1. How has your role changed over the course of the grant?
2. Looking back on the grant as a whole, what were the most notable successes? Why?
3. What would you say were the most notable challenges? (i.e., what do you wish would have gone better?)
    - How were these challenges addressed?
4. What do you wish you would have known from the beginning of the grant? (I.e., what are some lessons that you learned from this grant process?)
5. How to you think TRAMCON grant has affected the (college)?
6. Overall, how satisfied are you with the TRAMCON programs? Why?

Program Implementation Discussion
7. Can you tell us about the CareerSource area you serve?
8. Can you tell us about your role specifically with CareerSource?
9. How has CareerSource collaborated with [College Name] in the past? (probe for history of relationship)

Job Placement and Readiness
10. What were the primary job readiness services that you offered to students? What went well? What didn't go well?
    - What was most impactful for getting participants employed, in your opinion?
11. What were the primary job placement supports? What went well? What didn't go well?
    - What was most impactful for getting participants employed, in your opinion?
12. How were partners actually engaged throughout the program for recruitment and/or placement purposes?
    - How did you build these partnerships?
    - Who would you consider to be the college's most influential partner and in what way(s) have they been involved in grant activities? *(Specific employers, workforce system, specific philanthropic organizations, educators, etc.)*
    - Who would you consider to be the least influential and why?
13. Tell me what you have heard from employer partners about TRAMCON completers.
14. What kind of feedback have you received from employers about the credentials earned?
    - How relevant do the employers feel the credentials are?
15. What were the major challenges and barriers to connecting students to employment?
    - Specifically, in terms of job readiness, and job placement
16. On a scale of 1 to 10, with one being not at all, do you find that TRAMCON participants are ready for the job market? Please explain your rating.

Employer Partner Facilitation Guide
1. Tell us about your company and the kind of work you do.
2. How you were initially introduced to TRAMCON?
3. How you have been involved with TRAMCON? (probe for contributions in terms of program design; curriculum development; recruitment; training; placement; program management; leveraging of resources; commitment to program sustainability)
    - Which areas of contribution do you feel are most likely to add to the success of the program? Could you talk more about these?
    - Were there any areas you expected and/or hoped to make a contribution to the program, but were unable to? Could you talk more about these?

4. On a scale of 1-10, with 1 being not at all, to what extent do you feel the program adequately prepares students for employment/ better pay? Please explain your rating.
   o To what extent, do you feel that the credentials that students earn are relevant for the job market in the area?
   o What, if any, other courses, assessments, or credentials do you think could have led to better outcomes or could better prepare students for the job markets?
5. How satisfied are you with your experience as a grant partner? Why?
6. How does your experience with [College Name] on this grant compare to past experiences you've encountered with partners?
7. What can [College Name] do to improve your experience with TRAMCON?
8. Would you choose to be a program partner again?

Student Facilitation Guide
1. How did you initially learn about this program?
2. What interested you most about it? (I.e., what factors encouraged you to enroll?)
3. Tell me about any supports (like tutoring or counseling) you have received.
   o What support services do you feel were most useful in helping you stay and complete your training program?
   o What support services do you feel were most helpful to you in terms of getting ready for a job and job placement? Why?
4. Tell me about your experience with your classes.
   o What do you like?
   o If you could change one thing, what would it be?
   o In what ways do you feel that the credentials you will earn through this program will help you get a job in the field?
5. On a scale of 1-10, how satisfied are you with the courses you are taking in the program? Tell me about that rating.
6. What will completing this program help you do? (probe re: jobs, continuing education)
7. What advice would you give a future student who was interested in enrolling in a program at this college?
8. Any additional thoughts about the courses you are taking?

College Leadership Facilitation Guide
1. What has been your experience with the TAACCCT grant at (college)?
2. Looking back on the grant as a whole, what were the most notable successes? Why?
   o Which programs are working well? Which are not? Why?
   o Which services do you feel were most successful? Which were least? Why?
3. What would you say were the most notable challenges? (i.e., what do you wish would have gone better?)
   o How were these challenges addressed?
4. What do you wish you would have known from the beginning of the grant? (I.e., what are some lessons that you learned from this grant process?)
5. How valuable are the programs of study to your college?
6. What programs do you believe will be sustained beyond the grant? Which specific elements of the programs that will be sustained?
   o Are there are components that you feel *should* be sustained and why?
   o Are there any structural changes that have occurred as a result of the grant?

7. Tell me about the extent to which you believe TRAMCON staff are receiving the support they need (from the college and from MDC) to fully implement the program.
8. Overall, how satisfied are you with the TRAMCON programs? Why?

Curriculum Designer Facilitation Guide

Looking Back Discussion

1. What has been your experience to date with the rollout of the curriculum?
   - What were the most notable successes? Why?
   - What would you say were the most notable challenges? (i.e., what do you wish would have gone better?)
     - How were these challenges addressed?
2. How has program delivery changed over the duration of the TRAMCON grant?
   - What changed, and when?
   - Why did these changes need to occur?
3. What do you wish you would have known from the beginning of the grant? (I.e., what are some lessons that you learned from this grant process?)

Program Implementation Discussion

4. What is your perception of how students are engaging in TRAMCON curriculum in the classroom?
5. What kind of feedback are you receiving from the consortium and will that result in any changes?
6. How often and with who from the consortium are you discussing the progress?
7. Are you seeing changes in the manufactured construction industry?
8. Overall, how satisfied are you with the TRAMCON programs? Why?

Looking Forward Discussion

9. Going forward, what changes do you plan to make to program delivery?
10. What elements/programs do you believe will be sustained beyond the grant?
    - Are there are components that you feel *should* be sustained and why?
11. Any additional thoughts about your TRAMCON program or the TRAMCON grant in general?

Appendix C: Outcomes Evaluation Methodology and Detailed Statistical Results

Data Collection

Grant staff at each consortium college collected student data and entered the data into an Efforts to Outcome (ETO) database. Staff at Miami Dade, as the consortium lead, managed the database and served as the Evaluation Team's main point of contact for data. The Evaluation Team used a specific process for collecting the final dataset from the consortium. First, the Evaluation Team requested a representative test pull of consortium data for students enrolled in TRAMCON to examine what variables would be needed for the final dataset. Next, grant staff at Miami Dade linked all student IDs to Social Security Numbers (SSNs) and submitted the data to the Florida Department of Economic Opportunity (DEO), who provided all quarterly wage records associated with each of the student SSNs. Grant staff at Miami Dade removed the SSNs from the data file and merged the UI wage data with the original TRAMCON data file. Finally, grant staff at Miami Dade securely transmitted the de-identified dataset to the Evaluation Team, according to the data sharing agreement.

The dataset used for the analyses of credentials was more robust than that used for the wage analyses, in that the dataset used for the analyses of credentials included more students, and as a result, more credentials. This was because the dataset with wages had to be pulled at an earlier date to ensure that there was enough time to collect UI wage data from the Florida DEO, as well as to perform the additional complex cleaning and coding of wages to ensure that pre-and post-wage growth could be measured. Credential data was pulled again at a later date as grant staff reported there was a delay in receiving physical credentials for students, which resulted in credential data entry being delayed. The Evaluation Team requested a new dataset to ensure all available data on student credentials earned were included in the analyses. The sample size for the wage analyses was 1,132 students. The sample size for the credential analyses was 2,234 students. As a reminder, these data files were composed of students who earned credentials only.

Data Cleaning and Coding

College Data

Data from the four colleges included background information (e.g., race, ethnicity, gender, age, veteran status, previous education), as well as the dates when the students enrolled in each level of the program and when they earned their credential.

Three dates had data entry errors:

- One date was entered as 3/10/2108 as the start date for a level of the program. The Evaluation Team changed the date to 3/10/2018. The date where they earned the credential was 3/31/2018, which helped the Evaluation Team confirm that this change was logical.
- Another date entered was 5/16/2019 as a start date for a level of the program, but the end date was 5/19/2016. The start date was changed to 5/16/2016.
- One student had an end date entered as 12/9/2005. The start date was 10/19/2015, so the end date recorded was not feasible, and was changed to 12/9/2015.

Other data entry errors were changed:

- In four instances, one ID number was assigned to two different students, so a new ID number was assigned for one of the students. In three instances, one ID number was assigned to three different students, so a new ID number was assigned for two of the students.

- In two instances, a student had both OSHA Construction and OSHA General Industry recorded. These students were counted as receiving just one OSHA credential, as students could only receive one.
- One student had two separate entries recorded for the same credential (NCCER Core) with different start dates. The most recent start date was chosen.
- Another student had two separate entries recorded for the same credential (NCCER Core) with different start dates. The most recent start date was chosen.
- In two instances, a student had two separate entries for the same credential (NCCER Manufactured Construction Level II) with different start and end dates. Only one entry (the most recent) was chosen.
- One student had two separate entries for the same credential (NCCER Project Management/Sustainable Construction Supervisor) with different start and end dates. Only one entry (the most recent) was chosen.
- Another student had two separate entries for the same credential (NCCER Core) with different education levels (currently attending and post-secondary vocational school). All other information was identical, so the entry with actual highest level of education was taken.

Wage Data

Wage data was submitted for each quarter of 2015, 2016 and 2017. No 2018 wage data was available, so the data used in this analysis ranged from Q1 of 2015 to Q4 of 2017. Wages across quarters were combined pre-program and post-program. Because of the variety of start and end dates, program start and end dates were categorized by quarter to parallel the wage data available. Not all students had wage data recorded in the UI database for them, so the quarters when wages were available was inconsistent. For the wage data, there were a number of outliers, as shown the table below.

Table C1. Wages by Quarter before Trimming

		# of Students with Wages Available	Min	Max	Mean	Median	SD	5th Percentile	95th Percentile
2015	Q1	783	$1.00	$85,978.00	$7,232.05	$5,828.00	$6,735.62	$252.20	$18,107.60
	Q2	825	$1.00	$89,391.00	$7,408.99	$6,111.00	$6,689.95	$393.00	$18,783.90
	Q3	805	$31.00	$55,608.00	$7,353.21	$5,937.00	$5,984.04	$335.10	$18,744.50
	Q4	837	$18.00	$62,324.00	$7,949.18	$6,456.00	$6,746.32	$447.60	$20,205.10
2016	Q1	849	$22.00	$63,079.00	$7,218.73	$6,317.00	$5,948.84	$328.00	$16,866.00
	Q2	888	$2.00	$60,695.00	$8,211.33	$6,733.50	$7,414.08	$342.70	$22,460.25
	Q3	921	$22.00	$71,634.00	$8,213.07	$7,000.00	$6,636.94	$435.80	$19,637.70
	Q4	962	$40.00	$78,240.00	$8,086.10	$6,676.00	$7,035.42	$405.60	$19,778.45
2017	Q1	986	$8.00	$49,511.00	$7,838.89	$6,719.00	$6,327.70	$326.05	$19,393.15
	Q2	1,031	$34.00	$65,315.00	$8,194.11	$7,125.00	$6,776.30	$425.40	$19,868.00
	Q3	1,049	$16.00	$65,529.00	$8,249.26	$7,216.00	$6,732.58	$420.50	$19,301.50
	Q4	1,089	$27.00	$53,867.00	$8,621.49	$7,566.00	$6,629.30	$567.00	$20,283.50

Note. Min=Minimum, Max=Maximum, SD=Standard Deviation. The 5th and 95th percentiles may not be actual numbers in the dataset but computed from the distribution of the wages available.

As such, the wage data was trimmed from the bottom and top five percent. The descriptive statistics for the wage data used in the analysis is shown in the table below.

Table C2. Wages by Quarter after Trimming

		# of Students with Wages Available	Min	Max	Mean	Median	SD
2015	Q1	705	$253.00	$18,094.00	$6,590.77	$5,828.00	$4,377.02
	Q2	743	$414.00	$18,779.00	$6,801.08	$6,111.00	$4,585.09
	Q3	725	$340.00	$18,664.00	$6,883.61	$5,937.00	$4,578.90
	Q4	755	$448.00	$20,193.00	$7,371.50	$6,456.00	$5,062.98
2016	Q1	765	$329.00	$16,859.00	$6,759.53	$6,317.00	$4,369.03
	Q2	800	$346.00	$22,419.00	$7,438.77	$6,733.50	$5,259.29
	Q3	829	$443.00	$19,500.00	$7,714.54	$7,000.00	$4,928.41
	Q4	866	$409.00	$19,645.00	$7,450.09	$6,676.00	$4,845.37
2017	Q1	888	$341.00	$19,152.00	$7,347.86	$6,719.00	$4,874.28
	Q2	929	$437.00	$19,762.00	$7,596.34	$7,125.00	$4,862.99
	Q3	944	$448.00	$19,176.00	$7,721.94	$7,222.00	$4,940.15
	Q4	981	$573.00	$20,272.00	$8,128.81	$7,566.00	$5,069.70

Note. Min=Minimum, Max=Maximum, SD=Standard Deviation

Data Analysis

The Outcomes Evaluation was designed to examine the extent that students enrolled in the TRAMCON program had earned credentials and the relationship of earning these credentials on student post-program wages. Initially, a retrospective comparison group evaluation was planned, but no comparison data was available. As such, an outcomes design was used, where a variety of descriptive and inferential statistics were computed. The following table shows the types of analyses used to answer the research questions.

Table C3. Outcomes Evaluation Research Questions, Data Sources, Design, and Analysis Approaches

Research Questions	Data Sources	Design	Analysis Approaches
Q1. How does completion of credentials differ by demographic, academic or geographic subgroup? a. How does credential completion at each college compare to TRAMCON as a whole? b. What is the variation in students earning credentials?	Administrative data from colleges and DEO	Outcome analysis	Inferential statistics, including t-tests and General Linear Modeling (GLM) procedures Descriptive statistics
Q2. To what extent did student mean post-program wages change? a. How do student wages differ by demographic, academic or geographic subgroup? b. What is the variation in post-program wages?	Administrative data from colleges and DEO	Outcome analysis	Inferential statistics, including t-tests and General Linear Modeling (GLM) procedures Descriptive statistics

In this type of design, the Evaluation Team used analyses from the General Linear Model (GLM) family[36] to determine what characteristics can explain or predict student outcomes, when

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[36] GLM is flexible, and relationships between two or more variables can be examined in the presence of multiple covariates. In GLM, one set of variables is predicted by another set of variables. Each variable added to the model can increase how well the original variables in the model are predicted. See Tabachnik, B.G., & Fidell, L.S. (2013). *Using Multivariate Statistics* (6th ed.). Boston, MA: Pearson.

controlling for background factors, and the extent of these relationships. GLM can consist of multiple regression, multilevel modeling, structural equation modeling, or another type of analysis applicable for the evaluation. For this evaluation, linear regression was chosen as the primary type of GLM technique. The general model for the evaluation were:

$$(P) = \beta 0 + \beta_1 (\text{Covariate}_i) \ldots + \beta_x(\text{CovariateX}_i)$$

where:
- (P) is the probability of the outcome of interest and given the values of the constant and covariates in the model.
- $\beta 0$ is the constant (i.e., intercept) in the model
- $\beta_1(\text{Covariate})\ldots \beta_x(\text{CovariateX}_i)$ are the covariates in the model

The Evaluation Team engaged in model fitting through sensitivity tests to determine what covariates should be included in the model, best model fit, sample size restrictions, etc. These were also done to ensure that substantial multicollinearity or other common statistical issues did not occur. Because this was a mixed methods evaluation, the results from the Implementation Evaluation were also used to inform the model development process. As such, certain variables were excluded because of some contextual factors that resulted in misleading results.

In addition to the GLM analysis, the Evaluation Team used another type of inferential statistics (paired t-tests) to determine if there was a significant change between pre-and post-program wages. Additionally, the Evaluation Team computed descriptive statistics, where they examined results disaggregated by college, highest level of education, and other relevant factors. Effect sizes (e.g., Cohen's *d*, standardized beta weights) were also computed, which helped substantiate any statistically significant results. IBM SPSS Statistics[37] was used for all statistical analyses, and G*Power[38] was used for power calculations.

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[37] IBM Corp. (2018). IBM SPSS Statistics for Windows, Subscription Service. Armonk, NY: IBM Corp.
[38] Faul, F., Erdfelder, E., Buchner, A., & Lang, A.-G. (2009). Statistical power analyses using G*Power 3.1: Tests for correlation and regression analyses. *Behavior Research Methods, 41*, 1149-1160.

Statistical Tables
Background Characteristics
Table C4. Student Demographic Characteristics by College (N=2,234)

| | Number/Percent within College | | | | |
	TRAMCON Consortium	Miami Dade	Polk	Santa Fe	Seminole
Total Number	**2,234**	**686**	**765**	**277**	**506**
Gender					
Female	**340 (15.2%)**	123 (17.9%)	84 (11.0%)	42 (15.2%)	91 (18.0%)
Male	**1,866 (83.5%)**	554 (80.8%)	672 (87.8%)	229 (82.7%)	411 (81.2%)
Missing [a]	**28 (1.3%)**	9 (1.3%)	9 (1.2%)	6 (2.2%)	4 (0.8%)
Race					
American Indian or Alaskan Native	**18 (0.8%)**	5 (0.7%)	3 (0.4%)	6 (2.2%)	4 (0.8%)
Asian	**34 (1.5%)**	5(0.7%)	3 (0.4%)	6 (2.2%)	20 (4.0%)
Black or African American	**730 (32.7%)**	262 (38.2%)	276 (36.1%)	77 (27.8%)	115 (22.7%)
Native Hawaiian or Other Pacific Islander	**12 (0.5%)**	5 (0.7%)	3 (0.4%)	1 (0.4%)	3 (0.6%)
White	**979 (43.8%)**	217 (31.6%)	319 (41.7%)	159 (57.4%)	284 (56.1%)
More than one Race	**32 (1.4%)**	4 (0.6%)	16 (2.1%)	3(0.4%)	9 (1.8%)
Missing	**429 (19.2%)**	188 (27.4%)	145 (19.0%)	25 (9.0%)	71 (14.0%)
Ethnicity					
Hispanic	**617 (27.6%)**	384 (56.0%)	102 (13.3%)	27 (9.7%)	104 (20.6%)
Non-Hispanic	**1,420 (63.6%)**	247 (36.0%)	573 (74.9%)	234 (84.5%)	366 (72.3%)
Missing	**197 (8.8%)**	55 (8.0%)	90 (11.8%)	16 (5.8%)	36 (7.1%)
Mean Age [b]	**37.1**	35.2	36.3	35.2	41.9
Veteran					
Yes	**177 (7.9%)**	29 (4.3%)	52(6.8%)	33 (12.0%)	63 (12.5%)
No	**2,051 (92.1%)**	653 (95.7%)	713 (93.2%)	242 (88.0%)	443 (87.5%)
Missing	**6 (0.3%)**	4 (0.6%)	0 (0.0%)	2 (0.7%)	0 (0.0%)
Has Disability					
Yes	**33 (1.7%)**	5 (0.8%)	15 (2.0%)	11 (4.1%)	2 (0.6%)
No	**1,962 (98.3%)**	658 (99.2%)	736 (98.0%)	256 (95.9%)	312 (99.4%)
Missing	**239 (10.7%)**	23 (3.4%)	14 (1.8%)	10 (3.6%)	192 (37.9%)
U.S. Citizen					
Yes	**2,029 (91.1%)**	523 (76.7%)	756 (98.8%)	270 (98.2%)	480 (94.9%)
No	**199 (8.9%)**	159 (23.3%)	9 (1.2%)	5 (1.8%)	26 (5.1%)
Missing	**6 (0.3%)**	4 (0.6%)	0 (0.0%)	2 (0.7%)	0 (0.0%)

[a] Missing includes the Other category, as the number of students for this category was very small (n=2).
[b] There were 27 missing responses for the age category.

Table C5. Prior Education Characteristics by College (N=2,234)

	Number/Percent within College				
	College				
	TRAMCON Consortium	Miami Dade	Polk	Santa Fe	Seminole
Total Number	**2,234**	**686**	**765**	**277**	**506**
Highest Level of Education					
High School Diploma or Equivalent or Less	**1,027 (46.0%)**	273 (39.8%)	462 (60.4%)	126 (45.5%)	166 (32.8%)
Some College	**265 (11.9%)**	61 (8.9%)	84 (11.0%)	44 (15.9%)	76 (15.0%)
Credential	**125 (5.6%)**	21 (3.1%)	48 (6.3%)	22 (7.9%)	34 (6.7%)
Associate Degree or Higher	**466 (20.9%)**	167 (24.3%)	75 (9.8%)	60 (21.7%)	164 (32.4%)
Missing [a]	**351 (15.7%)**	164 (23.9%)	96 (12.5%)	25 (9.0%)	66 (13.0%)

[a] Missing includes students who are currently attending school, so that their highest level of education was not known.

Credentials Earned

Results from the regression analysis showed that when controlling for other background factors, students who were not U.S. citizens and who were older were more likely to complete more credentials than students who were U.S. citizens or who were younger, as shown in the table below. Though not as strong, there were also significant relationships between number of credentials completed and ethnicity (i.e., Hispanic) and the number of credentials completed and gender (i.e., male), so that Hispanic students and female students were more likely to earn more credentials than non-Hispanic or male students. However, these relationships were not as strong as those of being a U.S. citizen and age. It should be a noted that though there is a substantial difference in the number of credentials earned between U.S. citizens (mean=1.29) and those who are not U.S. citizens (mean=1.57), the sample size for those who are not U.S. citizens is quite small, compared to those who were U.S. citizens (199 vs. 2,029).

Table C6. Summary of Linear Regression Analysis for Variables Predicting Number of Credentials Completed Controlling for Selected Variables (N=2,234)

	Slope of the Line/ Relationship	Avg. Distance of Points from the Regression Line	Weight/ Strength of Relationship	Chance there is a Difference (Stat. Significance)
Male [a]	-0.11	0.06	-0.05*	**94.00%**
Hispanic [b]	0.11	0.05	0.06*	**98.20%**
Age	0.01	0.00	0.07*	**99.20%**
Veteran [c]	0.03	0.08	0.01	27.80%
Disabled [d]	0.12	0.16	0.02	55.50%
US Citizen [e]	-0.27	0.07	-0.10*	**99.99%**
Highest Level of Education [f]	-0.03	0.02	-0.04	89.80%

Note. R^2= 0.03, adjusted R^2=0.02;
a Coded as a binary variable, where male=1, all other genders=0
b Coded as a binary variable, where Hispanic=1, not Hispanic=0
c Coded as a binary variable, where veteran=1, not veteran=0
d Coded as a binary variable, where disabled=1, not disabled=0
e Coded as a binary variable, where US citizen=1, not a US citizen=0

	$p \geq .10$
	$p < .10$
	$p < .05$
	$p < .01$

f Coded as 1=HS Diploma/equivalent or less; 2=some college; 3=post-secondary vocational skills/credential; 4=college degree Though the relationship was slightly negative in the regression results, the overall pattern was positive when the descriptive results were computed, so that students with more prior education did receive more credentials. The reason for the negative sign in the regression results was due to sample size, since a smaller group of students earned more than one credential. When this group is disaggregated by highest level of education, where fewer students had some college or a credential, the sample sizes become quite small, compared to the groups who had a high school diploma equivalent. A larger number of students had a high school diploma equivalent or less, and these students earned slightly more credentials than students who had some college. However, students who had a post-secondary vocational skill credential or college degree received more credentials, though this group was much smaller than the group of students who had a high school diploma equivalent or less.
*p<.10.

Statistical Results-Post-Program Wages

As shown in Table C7, students who earned more credentials earned lower wages both pre- and post-program, which is a surprising finding. The reason for this finding was due to the sample size, and less variation among the wage data. The standard deviations provide evidence for this, as they were larger for those with less credentials. As a result, there was more variability for those with less credentials, in that those with fewer credentials have a more spread out distribution than those who have more credentials.

Table C7. Pre-and Post-Program Wages by Number of Credentials Earned

	Mean Wage	
	Pre-Program	**Post-Program**
Total (N=1,132/901)	**$6,327.16**	**$7,051.65**
1 (N=907/662)	$6,887.71	$7,803.28
2 (N=206/227)	$4,116.35	$4,991.59
3 or more (N=19/12)	$3,538.26	$4,556.35

Across the consortium, the Pearson r correlation between the wages was found to be significant (r=0.83, *p*=0.00). The paired t-test was computed for pre-program and post-program wages, and the results are shown in Table C8. The paired t-statistic was significant (t=15.08, *p*=0.000), and the wages were significantly higher after program completion. The effect size between the pre-

and post-program wages was small, but not negligible.[39] However, since this type of test does not include any controlling variables or comparison group, the results should be interpreted with caution.

Table C8. Paired t-test Results for Pre-and Post-Program Wages (N=898)

	Mean	t-Statistic	Effect Size
Pre-Program Wages	$6,729.04	15.08*	0.30
Post-Program Wages	$8,143.54		

Note. The sample size is smaller for this analysis, as at least one quarter of both pre-and post-program wages was needed to be included in the analysis.
*p<.0.05

As shown in Table C9, students at three of the four consortium colleges earned an increase in their mean post-program wages, and on average TRAMCON students earned an increase in post-program wages. Students from Seminole had higher post-program wages, but they also had higher levels of prior education before enrolling in TRAMCON programming than students at the other colleges, and higher pre-program wages. Students from Santa Fe earned the greatest increase in their wages after program completion, with an increase of $1,160.20.

Table C9. Mean Pre-and Post-Program Wages by College

	TRAMCON Consortium	Miami Dade	Polk	Santa Fe	Seminole
Pre-Program Wages					
# of Students with Wages Available	1,132	355	245	173	359
Mean Wage	$6,327.16	$5,323.16	$5,982.38	$4,939.32	$8,224.07
Post-Program Wages					
# of Students with Wages Available	901	256	238	113	294
Mean Wage	$7,051.65	$6,561.97	$5,708.98	$5,675.89	$9,093.74

Results from the regression analysis showed that when controlling for other background factors, a student's highest level of prior education and pre-program wage students were the most substantial factors in explaining post-program wages, which is not a surprising finding. As shown in the table on the following page, students with higher levels of education and who had higher pre-program wages earned more post-program wages when controlling for other background characteristics. Put another way, if a student had a higher level of prior education, the post-program wages earned by the student increased by $365.57. For each dollar increase in pre-program wage, the post-program wages earned by the student increased by $0.87.

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[39] Cohen's *d* (the effect size) is calculated by the change in the pre-and post-program wages divided by the pooled standard deviation for both pre-and post-program wages and can be thought of as a standardized difference. Effect sizes range from small (0.20), to medium (0.50) and large (0.80), see Cohen, J. (1988). Statistical power analysis for the behavioral sciences (2nd ed). Hillsdale. NJ: Lawrence Earlbaum Associates, 2.

Table C10. Summary of Linear Regression Analysis for Variables Predicting Mean Post-Program Wages Controlling for Selected Variables (N=901)

	Slope of the Line/ Relationship	Avg. Distance of Points from the Regression Line	Weight/ Strength of Relationship	Chance there is a Difference (Stat. Significance)
Male [a]	570.67	382.32	0.04	86.40%
Hispanic [b]	213.39	306.82	0.02	51.30%
Age	4.11	12.86	0.01	25.00%
Veteran [c]	576.37	543.74	0.03	71.00%
Disabled [d]	-2646.14	2933.93	-0.03	63.20%
US Citizen [e]	-142.68	460.98	-0.01	24.30%
Highest Level of Education [f]	365.57	112.52	0.10*	**99.90%**
Level of Credential [g]	-864.96	637.21	-0.04	82.50%
Mean Pre-Program Wage	0.87	0.04	0.78*	**99.99%**

Note. R^2= 0.82, adjusted R^2=0.67;
a Coded as a binary variable, where male=1, all other genders=0
b Coded as a binary variable, where Hispanic=1, not Hispanic=0
c Coded as a binary variable, where veteran=1, not veteran=0
d Coded as a binary variable, where disabled=1, not disabled=0
e Coded as a binary variable, where US citizen=1, not a US citizen=0
f Coded as 1=HS Diploma/equivalent or less; 2=some college; 3=post-secondary vocational skills/credential; 4=college degree
g Coded as 1=Foundation (OSHA 30 or NCCER Core); 2=NCCER MC Level I; 3= NCCER MC Level II. MSSC CPT not part of the coding for this variable since it was standalone but was used for other analyses. Additionally, no data was included on NCCER Project Management/Sustainable Construction Supervisor credentials, so this was not included in the coding scheme.
*p<.10.

	p $\geq$.10
	p<.10
	p<.05
	p<.01