Third-Party Evaluation of MoSTEMWINs: Implementation, Outcomes, and Impact

Missouri STEM Workforce Innovation Networks:

Grant Number TC-26470-14-60-A-29

Metropolitan Community College

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Abbreviation	Definition
C&A	Cosgrove & Associates
CBE	Competency-based Education
CC	Crowder College
CPL	Credit for Prior Learning
CPT	Certified Production Technician
CSIS	Computer Science Information Systems
CTE	Career and Technical Education
DED	Department of Economic Development for the State of Missouri
DOE	U.S. Department of Education
DOL	United States Department of Labor
DWD	Division of Workforce Development
ECC	East Central College
EPR	Evaluation Progress Report
ETO	Efforts to Outcomes by Social Solutions
FORCE	Find, Onboard, Retain, Complete, Employ
HPTRL	Health Professions Tutoring and Resource Lab
IT	Information Technology
JC	Jefferson College
LMI	Labor Market Information
MA	Medical Assistant
MAC	Mineral Area College
MACC	Moberly Area Community College
MCC	Metropolitan Community College
MCCA	Missouri Community College Association
MDHE	Missouri Department of Higher Education
MoHealthWINs	Missouri Health Workforce Innovations Network
MoManufacturingWINs	Missouri Manufacturing Workforce Innovations Network
MOOC	Massive Open Online Course
MoSTEM	Missouri STEM Workforce Innovations Network
MoSTEMWINs	Missouri STEM Workforce Innovations Network
MoWINs	Missouri Workforce Innovations Network
MSW	Missouri STEM Workforce Innovations Network
NCMC	North Central Missouri College
OTC	Ozarks Technical Community College
POS	Program of Study
SCC	St. Charles Community College
SFCC	State Fair Community College
SGA	Solicitation for Grant Applications
SI	Supplemental Instruction

Abbreviation	Definition
SME	Subject Matter Expert
SOW	Statement of Work
SSN	Social Security Number
STCM	State Technical College of Missouri
STEM	Science, Technology, Engineering and Math
STLCC	St. Louis Community College
TAA	Trade Adjustment Assistance
TAACCCT	Trade Adjustment Assistance Community College and Career Training
TPE	Third-Party Evaluator
TRC	Three Rivers College
UI	Unemployment Insurance
WIA	Workforce Investment Act
WIB	Workforce Investment Board
WIOA	Workforce Investment Opportunity Act

Executive Summary

This report presents an evaluation of Missouri's STEM Workforce Innovation Networks: MoSTEMWINs (MoSTEM or MSW) grant as part of the Round 4 Trade Adjustment Assistance Community College and Career Training (TAACCCT) program administered by the U.S. Department of Labor (DOL). This is the culminating report on grant implementation, performance outcomes, and impact.

In 2014, Missouri received a $14.9 million Round Four TAACCCT grant to meet the State's growing demand for STEM related workers. Twelve Missouri community colleges and the State's technical college came together under Missouri Community College Association (MCCA) leadership to form the MSW consortium. Missouri community colleges operate as a decentralized system, thus MCCA partnered with the grant's lead college (Metropolitan Community College) to coordinate and administer the MSW grant.

The MSW consortium colleges recognized the imperative to improve their instructional programs and support services to better meet the needs of adult-learners and other grant target populations, including TAA-eligible and Veteran students. To serve and impact these populations, the colleges needed to engage employers to help design new or enhance existing programs of study based upon industry-recognized, stackable credentials to align with existing or emerging STEM-related workforce pipeline needs. The colleges also understood the need to develop programs of study which could be completed in a condensed/accelerated manner and ultimately lead to employment in the following occupational clusters: Information Technology, Health Sciences, Life Sciences, Manufacturing, and Transportation.

To support the proposed theory of change, colleges employed a stackable certificate model connecting program awards to appropriate industry certifications associated with STEM occupations and careers. This model allowed for multiple entrance and exit points to give students options for training in short increments. To further support this model, colleges developed a learning framework offering students basic academic skills through contextualized courses as well as intrusive support services to help students prepare for and persevere to completion and employment.

This report provides both implementation and grant performance outcome evaluation, and it examines the impact of grant programs and strategies with regard to program completion and employment upon program completion. A multi-dimensional evaluation process was employed to meet Department of Labor evaluation requirements and provide the consortium and its member colleges with data and analysis related to the questions outlined below and referenced throughout this report.

1. Did MSW colleges implement programs and strategies as designed?
2. Did MSW colleges partner with employers to develop/redesign programs and to what extent were faculty and employers involved in ongoing support for students and program content?
3. What did the MSW colleges learn during implementation?
4. Did MSW programs serve the target population?
5. Did MSW participants achieve desired student outcomes, and how do actual grant outcomes compare to targeted grant outcomes?
6. How do program completion and employment results compare for grant participants to non-grant students?
7. What grant strategies appear to hold promise for long-term sustainability and scaling?

These questions guided data gathering using the following mixed methods to support the MSW outcome and impact evaluation:

- At the request of the TPE, Consortium colleges created individual storyboards to depict the specific logic model related to their efforts.
- Unit-record participant and outcome (academic and employment data) files were collected from each college for each grant participant. These quantitative data were recorded, tracked, and shared with the evaluation team and grant partners on a regular basis. The Consortium acquired employment and wage data through a partnership with Missouri Division of Workforce Development (DWD). Where gaps in employment data occurred, colleges conducted employment follow-up data collection activities to determine student employment status. Verification of employment was gained by college personnel using DOL-approved (WIA/WIOA) methods, including employee pay-stubs and letters from employers.
- TPE review of the Consortium quarterly reports.
- At key grant intervals colleges self-assessed program and strategy implementation using a tool designed by the TPE. This data collection enabled the colleges to report on stakeholder engagement and grant implementation over time and identify progress and challenges along the way (Appendix I).
- External subject matter experts (SMEs) gathered qualitative data for the DOL-mandated curriculum review on each grant-funded program of study. Findings and recommendations from the curriculum review report were disseminated to the colleges to encourage sustainability and improvement of new and improved curriculum funded by the grant.
- A non-equivalent control group, quasi-experimental design[1] was employed to compare outcomes for a first-time-to-college grant student cohort (2014 to 2017) with outcomes for a retrospective non-grant student sample that enrolled in MSW member colleges for the first time in fall 2013 (tracking period of 2013 to 2016). Unit-record data were collected for students from each member college to build the retrospective comparison sample of non-grant students. Students in the non-grant sample were first-time to college and enrolled in

[1] Stanley, J. & Campbell, D. (1966). *Experimental and Quasi-Experimental Designs for Research*. Chicago, IL. Rand McNally Co.

programs similar to MSW programs. Outcome variables for the comparison study included program completion and employment upon program completion.

- The TPE conducted multiple site visits with each member college during the grant. Site visits included review of self-assessment data and extensive interviews with faculty, grant staff, student support personnel, college leadership, students and external grant partners.
- The TPE designed and implemented faculty follow-up surveys to examine the extent of faculty involvement in and perception of the impact on student success of activities related to employer engagement in program design, curriculum development, student support, and completer employment.
- The TPE designed and implemented employer surveys to examine the extent to which employers were involved in program design, curriculum development, and ongoing support for students and programs, as well as employer satisfaction with program completers.
- TPE attended and reported on evaluation progress at all grant leads' meetings and advisor meetings and well as participated in consultations with member colleges.
- TPE interviews with the Executive Director of Missouri Director of Economic Development and the Missouri Commissioner of Higher Education
- Annual presentations/data exchanges at state meetings. Such presentations and data exchanges were designed to encourage cross-campus discussion and interpretation of grant evaluation data.
- All data were cross-referenced with the colleges' oral report-outs, the Consortium QNPR reports and other college and Consortium grant documents. Triangulating the performance and implementation data, improved the evaluation team's confidence about evidence to address the evaluation questions.

The implementation evaluation draws on Weiss'[2] concept of process evaluation and Chen's [3] work on theory-driven evaluation to understand what is happening inside the program. By partnering with the consortium to employ two linked evaluation efforts---implementation and outcomes/impact, the consortium and its colleges are in a better position to document what was delivered and achieved with grant funds and to evaluate and learn more about the impact of such actions on student outcomes.

Although the evaluation team, member colleges, and consortium leadership took great care to ensure the validity and reliability of all data, the following list of possible limitations associated with these data should be considered when interpreting evaluation outcome and impact results.

- Participant enrollment and tracking to DOL-required metrics and grant performance outcomes continued to challenge the colleges' existing data collection system/processes, as anticipated. To address such challenges, adaptations to existing information systems were required and secondary data reporting systems were developed and used. The consortium

[2] Weiss, C. H., (1998). *Evaluation: Methods for studying programs and policies*. Upper Saddle River, NJ: Prentice Hall.

[3] Chen, H. (2004). The roots of theory-driven evaluation: Current views and origins. In M. Alkin (Ed.), *Evaluation roots: Tracing theorists' views and influences* (pp. 132-152). Thousand Oaks, CA: Sage

purchased and implemented Social Solutions' ETO software to collect and manage all grant participant unit-record data (https://www.socialsolutions.com/software/eto/). During such processes, it is possible that errors may have occurred in coding and entering student-level data.

- The consortium collected employment and wage data using valid Social Security Numbers (SSN) matched with state unemployment insurance (UI) records, however these data often lagged behind actual employment and wages by 8-9 months. Although colleges also worked to administer student follow-up surveys and results were used to supplement official UI employment and wage data, such surveys did not adequately capture wage data. Thus, although post-grant employment data were supplemented, accurate and verifiable wage data connected to the survey responses were often lacking. The lack of a consistent source for actual wage data limited available wage data and may have resulted in an over-statement of actual wages.
- Partner colleges used the statewide ETO data collection system to report whether or not a participant continued their education post-grant. However, the consortium did not validate such data using the statewide/national Clearinghouse transfer database.
- Faculty and employer engagement data collected through follow-up surveys may be subject to "positive-response bias", as faculty and employers sense an expectation to respond positively to such surveys.
- Self-assessments of grant progress, including the scaling and sustainability of grant-funded programs and strategies, were completed by those working directly with the grant. Given the extensive commitment of such staff to grant success, such respondents may have an inflated view of grant progress, scaling, and sustainability.

To address data limitations, the evaluation team, along with MSW Consortium leaders and staff, employed the following strategies.

- The consortium provided extensive and ongoing training related to the ETO data system and related data entry procedures. To aid the consortium in data validation, the TPE would conduct participant, program completion and employment data analysis on a quarterly basis and share this ongoing data analysis with the consortium. This data sharing provided the consortium and the member colleges, the opportunity to verify and clean data files as needed.
- Consortium leaders and staff issued quarterly pathway-to-performance reports on enrollment, completion, and financial data and asked colleges to review and confirm data for accuracy.
- Three times during the grant (baseline, mid-point, and final point), each college completed a self-assessment tool aligned with their MSW work plan. The tool was cross-referenced with grant team leadership at each college regarding the more complex values of sustaining and scaling innovation.

The evaluation team recognized the complex nature of the grant innovations and worked with the consortium to implement a Developmental Evaluation[4] model to support innovation by using

[4] Patton, M. Q. (2011). *Developmental Evaluation: Applying complexity concepts to enhance innovation and use*. New York, NY: Guilford Press.

data to improve grant performance and decision-making while meeting DOL requirements. To help the consortium and its member colleges use evaluation data for continuous improvement, the evaluation team provided a baseline evaluation report (fall, 2015) and a mid-point interim evaluation report (spring, 2017). These reports can be found in Appendices III-IV. In addition to these formal reports, the evaluation team provided quarterly project updates, including analysis associated with key grant targets related to enrollment, program completion, and completer employment.

Due to DOL's expectation to build capacity while implementing the grant requirements, campus grant leadership had to design the innovation, change college processes and cultures to implement innovations, manage the grant within stated DOL compliance requirements, and achieve and track the results—all within four years. Although laudable, DOL's challenge to build capacity did not always align with DOL's required reporting metrics and therefore may have been an unrealistic expectation for the designated time period.

The following represent key data results related to this evaluation.

- Enrollment of 2,935 surpassed grant target by 58%.
- Grant Program of Study (POS) completers (1,903) surpassed the grant target by 28%. The Program of Study completion rate of 65% was less than the grant target program completion rate of 80%.
- Grant Program of Study (POS) completers employed at program completion (1,141) surpassed the grant target of program completers employed by 54%. The employment rate for grant POS completers of 60% surpassed the grant target employment rate of 50%.
- Colleges used employer input and engagement to create and/or redesign 40 programs built upon industry-requested stackable credentials.
- Colleges provided college access to unemployed and academically low-skilled adults and other key target groups.
    - Average age of participants was 33
    - 2% were TAA eligible
    - 7% were Veterans
    - 89% were either unemployed or under-employed at program start-up
    - 60% were academically low-skilled at program start-up
    - 41% were enrolling in college for the first-time
- Throughout the grant, colleges partnered with local Career Centers and local employers/community partners to recruit students. Eleven percent of the participants (325) were referred to a campus by a Career Center and 20% (574) were referred by a local employer or other community partner.
- A total of 1,903 participants completed at least one program of study. Counting all program awards and stackable credentials, participants received 3,935 industry-requested awards/credentials.

- Sixty percent of the program completers secured employment upon program completion with an annual estimated average wage of $28,000. Due to incomplete wage data, the TPE can only estimate an annual average wage based upon available post-grant quarterly earnings.
- Fifty-eight percent of the program completers who started as unemployed secured employment upon program completion with an annual estimated average wage of $27,000. Due to incomplete wage data, the TPE can only estimate an annual average wage based upon available post-grant quarterly earnings.
- Through the development and implementation of short-term, career programs, MSW grant participants appeared more likely than non-grant students to complete a program award.

Data presented in this report point to the success of MSW grant participants and reveal that grant participants completed programs and secured employment at higher rates than students in more traditional, non-grant programs. Although such results are encouraging, it is important for the consortium to focus on lessons learned during the grant. These lessons include the following.

- The importance of connecting classroom faculty, advisors, and instructional support staff as accelerated programs and curriculum often require increased instructional support for students;
- Advising and career coaching is a continuous process that covers the entire student experience from recruitment to program completion and onto employment;
- Programs connected to career pathways and built upon industry-recognized credentials are valued by students and employers;
- Accelerated and contextualized approaches to developmental education provide meaningful alternatives to more traditional, term-based developmental education models;
- Community and employer partnerships must be continuously cultivated to produce intended results.
- When developing and implementing programs and instructional support strategies for the adult, first-time college segment, colleges recognized the importance of creating multiple points of intervention and support across the entire student experience from recruitment and program onboarding, and onto program retention and completion, and, finally, employment. In addition, college faculty and staff grew to understand it was their responsibility to pro-actively engage with students to help ensure students connected with such interventions and support services. To help further explore this phenomenon we operationalized this process as the ***F.O.R.C.E.*** model (**Find**/Recruit, **Onboard** to Career Pathway, **Retain** Students, **Completion** of Program, and **Employed** Post Program Completion).

Individual campus culture/climate certainly impacted the extent to which MSW innovations and experimentation were supported. For those campuses who embraced the experimental nature of MSW, the grant has laid a solid foundation for further development, scaling and sustainability of efforts highlighted below.

In such instances, the TPE saw evidence of the following scientific inquiry process: identification of an area for investigation; development of a strategy and hypothesis for impact; collection and interpretation of data related to hypothesis; and use of data analysis for continuous improvement.

It is worth noting MoSTEMWINs was Missouri's third statewide TAACCCT grant and TPE observations point to the continued development of statewide lessons learned. The Round 4 MoSTEMWINs grant built upon accomplishments and lessons learned from Rounds 1 and 2. A key piece of this cumulative experience is connected to the state's experience in working together as a consortium. The consortium helped develop and expand a learning network between and among partner colleges. Colleges consistently reported to the TPE the benefits of working and learning together as they implemented grant programs and strategies. College faculty and staff found the connections made to be useful in carrying out consortium-specific work and expanding such efforts to other non-grant areas.

- Development and redesign of programs using career pathways.
- Redesign of developmental education.
- Adoption of intrusive student and instructional support strategies.
- Expanded use of employer partnerships and engagement to support program creation and continuous improvement.
- Greater use of alternative instructional formats using non-term based and accelerated models, stackable credentials, and credit for prior learning.

PREFACE

The MoSTEMWINs (MSW) Round 4 TAACCCT grant built upon successful innovations from Missouri's Round One and Round Two TAACCCT grants. MoSTEMWINs provided the partner colleges the opportunity to expand and further develop a number of innovative instructional and student support strategies. Such strategies were designed to meet the needs of adults seeking to acquire industry recognized program awards and credentials in STEM fields and gain employment in the growing STEM industry sector. Many of the strategies were transformative and challenged existing organizational culture and long-standing processes/practices.

Despite such challenges, the colleges pushed forward and developed and/or redesigned 40 instructional programs connected to the following STEM career clusters: Information Technology, Health Sciences, Life Sciences, Manufacturing, and Transportation. Colleges also developed and expanded innovative approaches to providing intensive student support. From the onset, MSW Grant Management and the Evaluation Team recognized the complexity of the MSW effort and stressed the value of documenting and analyzing implementation, lessons learned, and outcomes.

This report provides detailed and extensive data associated with the DOL required metrics, including a comparison of MSW outcomes to performance targets (Figure 31) established in the MSW statement of work (SOW). In addition, this report follows the DOL approved evaluation plan and examines MSW outcomes for participant sub-groups. Taking this analysis one step further the report uses logistics regression analysis to explore MSW impact on program completion and employment.

We see evidence Missouri's community colleges have a vision for change extending beyond the grant and are prepared to leverage lessons learned during MSW to capitalize on areas of progress and potential. As Missouri's community colleges explore new areas for progress and potential, the Missouri Department of Economic Development has launched its Best in Midwest initiative.

> "Best in Midwest is an initiative that will transform Missouri's Department of Economic Development into the top economic development agency in the Midwest. It will focus extensively on helping businesses grow and create jobs and helping workers access training and acquire skills to find employment. Addressing this need will require DED to review its programs and structure, ensuring services are aligned with the business community's needs". (https://ded.mo.gov/content/best-midwest).

Leadership from Missouri's Department of Economic Development (DED) and Department of Higher Education (MDHE) are working collaboratively to support this effort to help ensure the appropriate connections among employers, workforce development and higher education strategies/innovations. This increased collaboration has the potential to spur the development of a growth mindset in which faculty, staff, and campus and statewide leaders see and respond to increased opportunities for improvement.

As Missouri community colleges and state agencies continue to work to develop promising practices and strategies and build upon the foundation created by the MSW grant, we invite you to explore the Executive Summary as well as the detailed data analysis provided throughout the report. Thank you for allowing us to be a part of your transformative journey.

Introduction

The Trade Adjustment Assistance Community College and Career Training (TAACCCT) program was launched in 2011 by the United States Department of Labor (DOL), in partnership with the United States Department of Education. As stated in the Solicitation for Grant Applications (SGA), a primary goal of the program is to "increase attainment of degrees, certificates, and other industry-recognized credentials and better prepare the targeted population, and other beneficiaries, for high-wage, high-skill employment" (p. 5, DOL SGA).

Missouri received Round One and Round Two TAACCCT awards to support career pathway and program development and student support strategies associated with the growing demand for skilled workers in the Healthcare (Round One, $19.9 million) and Advanced Manufacturing (Round Two, $14.9 million) industry sectors. In 2014, Missouri received a $14.9 million Round Four TAACCCT award named Missouri STEM Workforce Innovation Networks (MoSTEMWINs). Across Rounds One, Two, and Four, Missouri consortia supported the continued development of individual grant accomplishments and served as a learning network for member colleges to adapt and improve based upon lessons learned in each grant.

MoSTEMWINs Colleges

Crowder College (CC)
East Central College (ECC)
Jefferson College (JC)
Metropolitan Community College (MCC)
Mineral Area College (MAC)
Moberly Area Community College (MACC)
North Central Missouri College (NCMC)
Ozarks Technical Community College (OTC)
St. Charles Community College (SCC)
St. Louis Community College (STLCC)
State Fair Community College (SFCC)
State Technical College of Missouri (STCM)
Three Rivers College (TRC)

Figure 1: MoSTEMWINs Consortium colleges.

Since Missouri community colleges operate as a decentralized system, the colleges agreed to organize themselves under a consortium umbrella coordinated by the Missouri Community College Association to implement their Round Four grant. The 12 Missouri community colleges and the State's Technical College formed a collaborative consortium to provide opportunities for Missouri's TAA-eligible, long-term unemployed, and other dislocated workers (target population) to obtain strong science, technology, engineering and math (STEM) skills tied to occupations in the state's targeted economic clusters. It was a college-by-college decision whether to be part of the MSW Consortium. Ultimately, all 12 community colleges and the state's one technical college participated in the grant. Consortium colleges are identified on the map of Missouri in Figure 2.

The colleges employed a similar consortium model to administer their Round One and Round Two TAACCCT grants. Using lessons learned from statewide coordination of previous rounds and with an eye toward increasing a campus-based perspective, the colleges agreed to adapt their consortium model and chose Metropolitan Community College of Kansas City to partner with the Missouri Community College Association (MCCA) to administer and coordinate the MSW Consortium. The MSW Round Four consortium approach included the addition of a statewide financial administrator and statewide grant program administrator to be housed within the Metropolitan Community College organizational structure.

These campus-based statewide administrators worked cooperatively with the MCCA MSW Executive Grant Director to help increase campus-to-campus and campus-to-MCCA communication, as well as to ensure appropriate financial and programmatic grant implementation and compliance. These three positions were supported by a network of campus grant managers known as the "campus grant leads". This statewide network met regularly throughout the grant to share information, review accomplishments and challenges, and discuss strategies to ensure grant compliance and effective data reporting. In addition, as the colleges pushed forward with program and strategy development and considered possible means to sustain successful practices, the consortium provided a structure to help colleges support each other.

According to the statement of work, MoSTEMWINs was designed to create, expand,and redesign new and existing STEM programs at member institutions throughout the state to fill gaps identified by STEM employers in multiple industries. MoSTEMWINs also addressed the fundamental, underlying barriers that prevent the target population from entering and completing STEM programs by: (1) accelerating entry into career programs by offering opportunities to improve underdeveloped academic skills; (2) creating clear pathways to STEM careers; and (3) improving employment attainment for the target population. This consortium grant provided the opportunity to build

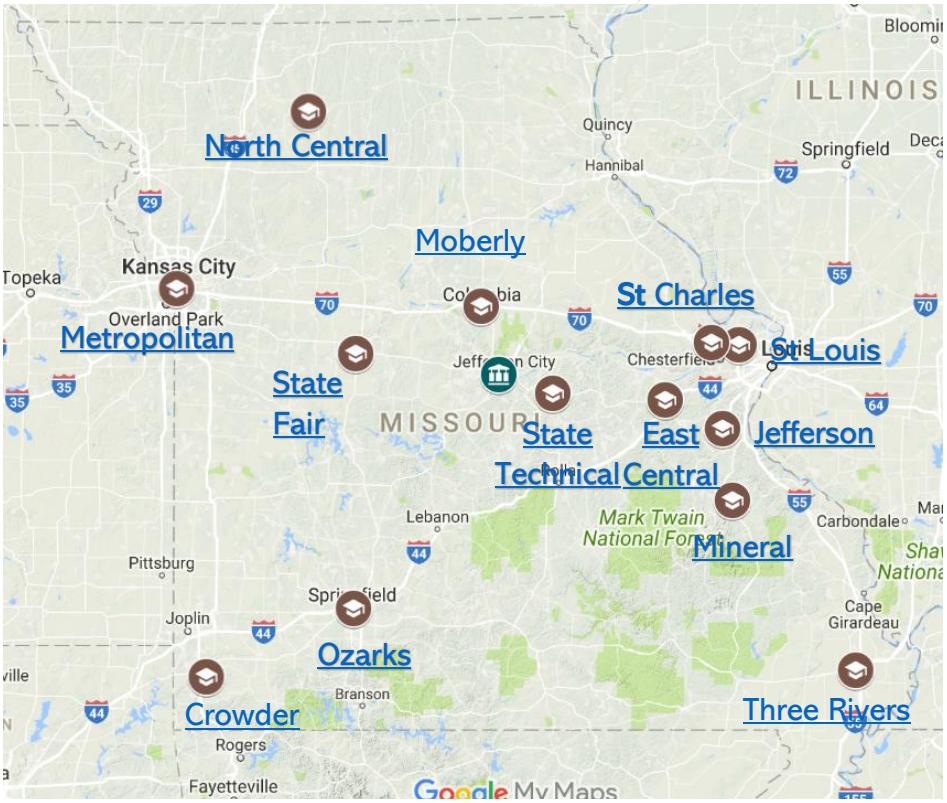

Figure 2: Map of Missouri community colleges.

upon lessons learned from State's Round One and Round Two awards and further develop living-wage programs of study in critical industry sectors and improve the capacity of community colleges to deliver up-to-date instructional and student support strategies.

As the overall grant administrative entity, MCCA and MCC contracted with Cosgrove & Associates LLC, St. Louis, Missouri (C&A) to serve as the Third-Party Evaluator (TPE) for the MSW effort. Cosgrove & Associates has a strong background in community college research, evaluation, instruction, and administration, and has extensive experience evaluating previous DOL TAACCCT grants.

This report provides a comprehensive description of evaluation methods, grant implementation and outcome evaluation, including the use of a quasi-experimental, non-equivalent control group design.[i] Furthermore, the report outlines key lessons learned through the grant and identifies strategies and policies which hold potential for further development and scaling.

EVALUATION DESIGN, METHODS, & ANALYSIS

Through a variety of analytical methods, including the use of a non-equivalent comparison cohort design to compare the outcomes of MSW participants with the outcomes from a retrospective sample of similar non-grant students, this report describes how the MSW grant affected the students and therefore the colleges and the State. Attention is given to the DOL-required metrics outlined in the MSW statement of work (SOW). In addition, the evaluation design went beyond DOL reporting and compliance metrics and stressed the importance of using results to identify and support lessons learned that may be meaningful for the purposes of capacity building and sustaining and/or scaling innovation and change.

Through routine reporting to grant leadership and the MSW colleges, the evaluation team used qualitative and quantitative data gathered throughout the grant to assist a wide range of stakeholders, including faculty and academic and student services administrators; grant leaders and their administrative teams; workforce and employer partners; and others to use data to improve the implementation of grant-funded innovations.

Innovative efforts like those associated with MSW, involve multiple partners and strategies and thus are likely to challenge traditional evaluation models. For this reason, the TPE partnered with the MSW consortium and the member colleges to implement a Developmental Evaluation[5] approach. "Developmental evaluation helps identify the dynamics and contextual factors that make the situation complex, then captures decisions made in the face of complexity, tracks their implications, feeds back data about what is emerging, and pushes for analysis and reflection to inform next steps." (2011, p. 30).

The TPE worked with consortium and campus grant leaders to systematically track grant implementation and performance outcomes. This partnership allowed both the TPE and grant leaders to examine progress and potential, as well as note challenges requiring attention and/or grant strategy adaptations. Through this approach, the TPE sought to establish their evaluation role as "critical friend"[6] to help the grant implementers view information in different ways, while still being sensitive to the overall grant goals and priorities. By connecting implementation and outcomes evaluation stages, the TPE and grant leadership were able to gain a deeper understanding of what occurred with the MSW grant and related instructional and student support strategies.

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[5] Patton, M., 2011 *Developmental Evaluation, Applying Complexity Concepts to Enhance Innovation & Use.*

[6] Costa, A.L. & Kallick, B. (1993). Through the lens of a critical friend. *Educational Leadership, 51*(2) 49-51.

Mixed Methods

The DOL TAACCCT grants called for rigorous evaluation along with extensive data collection and reporting for grant compliance, performance reporting, and accountability. To ensure data could be used for all these purposes, the TPE used mixed methods to collect qualitative and quantitative data to complement and inform the phenomenon being investigated.

MoSTEMWINs undertook a complex endeavor in a dynamic and evolving context, therefore calling for a multi-faceted data collection approach. The 13 Missouri colleges were attempting to work together as a consortium and independently to meet state and local workforce needs by developing and launching new programs of study, modifying existing programs of study, and designing and implementing innovative student support and instructional strategies. Therefore, the data gathered from colleges had to be sufficiently robust to stand on its own, but also consistent enough to be combined with other colleges' data to create a meaningful overall picture of the phenomenon. The following mixed methods were employed to support the MSW outcome and impact evaluation:

- At the request of the TPE, Consortium colleges created individual storyboards to depict the specific logic model related to their efforts.
- Unit-record participant and outcome (academic and employment data) files were collected from each college for each grant participant. These quantitative data were recorded, tracked, and shared with the evaluation team and grant partners on a regular basis. The Consortium acquired employment and wage data through a partnership with Missouri Division of Workforce Development (DWD). Where gaps in employment data occurred, colleges conducted employment follow-up data collection activities to determine student employment status. Verification of employment was gained by college personnel using DOL-approved (WIA/WIOA) methods, including employee pay-stubs and letters from employers.
- TPE review of the Consortium quarterly reports.
- At key grant intervals colleges self-assessed program and strategy implementation using a tool designed by the TPE. This data collection enabled the colleges to report on stakeholder engagement and grant implementation over time and identify progress and challenges along the way (Appendix I).
- External subject matter experts (SMEs) gathered qualitative data for the DOL-mandated curriculum review on each grant-funded program of study. Findings and recommendations from the curriculum review report were disseminated to the colleges to encourage sustainability and improvement of new and improved curriculum funded by the grant.
- A non-equivalent control group, quasi-experimental design was employed to compare outcomes for a first-time-to-college grant student cohort (2014 to 2017) with outcomes for a retrospective non-grant student sample that enrolled in MSW member colleges for the first time in fall 2013 (tracking period of 2013 to 2016). Unit-record data were collected for students from each member college to build the retrospective comparison sample of non-grant students. Students in the non-grant sample were first-time to college and enrolled in

programs similar to MSW programs. Outcome variables for the comparison study included program completion and employment upon program completion.

- The TPE conducted multiple site visits with each member college during the grant. Site visits included review of self-assessment data and extensive interviews with faculty, grant staff, student support personnel, college leadership, students and external grant partners.
- The TPE designed and implemented faculty follow-up surveys to examine the extent of faculty involvement in and perception of the impact on student success of activities related to employer engagement in program design, curriculum development, student support, and completer employment.
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- Annual presentations/data exchanges at state meetings. Such presentations and data exchanges were designed to encourage cross-campus discussion and interpretation of grant evaluation data.
- All data were cross-referenced with the colleges' oral report-outs, the Consortium QNPR reports and other college and Consortium grant documents. Triangulating the performance and implementation data, improved the evaluation team's confidence about evidence to address the evaluation questions.

To aid the MSW consortium and member colleges in the use of evaluation data for continuous improvement, the evaluation team provided a baseline evaluation report and a mid-point evaluation report (November 2015 and March 2017. In addition to these formal reports, the evaluation team provided quarterly project updates, including analysis associated with key grant targets related to enrollment, program completion, and completer employment

Limitations of Data

Although the evaluation team and the consortium leadership/staff took great care to ensure the validity and reliability of all data, including ongoing training for college grant team members on interpreting and recording data variables and attributes, the limitations listed below should be considered when interpreting the evaluation results.

- Participant enrollment and tracking to DOL-required metrics and grant performance outcomes continued to challenge the colleges' existing data collection system/processes, as anticipated. To address such challenges, adaptations to existing information systems were required and secondary data reporting systems were developed and used. The consortium purchased and implemented Social Solutions' ETO software to collect and manage all grant participant unit-record data (https://www.socialsolutions.com/software/eto/). During such processes, it is possible that errors may have occurred in coding and entering student-level data.
- The consortium collected employment and wage data using valid Social Security Numbers (SSN) matched with state unemployment insurance (UI) records, however these data often lagged behind actual employment and wages by 8-9 months. Although colleges also worked to administer student follow-up surveys and results were used to supplement official UI employment and wage data, such surveys did not adequately capture wage data. Thus, although post-grant employment data were supplemented, accurate and verifiable wage data connected to the survey responses were often lacking. The lack of a consistent source for actual wage data limited available wage data and may have resulted in an over-statement of actual wages.
- Partner colleges used the statewide ETO data collection system to report whether or not a participant continued their education post-grant. However, the consortium did not validate such data using the statewide/national Clearinghouse transfer database.
- Faculty and employer engagement data collected through follow-up surveys may be subject to "positive-response bias", as faculty and employers sense an expectation to respond positively to such surveys.
- Self-assessments of grant progress, including the scaling and sustainability of grant-funded programs and strategies, were completed by those working directly with the grant. Given the extensive commitment of such staff to grant success, such respondents may have an inflated view of grant progress, scaling, and sustainability.

To address data limitations, the evaluation team, along with MSW consortium leaders and staff, employed the following strategies:

- The consortium provided extensive and ongoing training related to the ETO data system and related data entry procedures. To aid the consortium in data validation, the TPE would conduct participant, program completion and employment data analysis on a quarterly basis and share this ongoing data analysis with the consortium. This data sharing provided the consortium and the member colleges, the opportunity to verify and clean data files as needed.

- Consortium leaders and staff issued quarterly pathway-to-performance reports on enrollment, completion, and financial data and asked colleges to review and confirm data for accuracy.
- Three times during the grant (baseline, mid-point, and final point), each college completed a self-assessment tool aligned with their MSW work plan. The tool was cross-referenced with grant team leadership at each college regarding the more complex values of sustaining and scaling innovation.

MoSTEMWINs:
Theory of Change

Based upon their experiences in Rounds One and Two, MSW Colleges saw it as imperative to improve their instructional programs and support services to better meet the needs of the target student populations. To best serve this population, the colleges first needed to engage employers and community partners to redesign and improve programs of study based upon local workforce needs aligned with emerging and existing industry-recognized, stackable credentials. The colleges understood they needed to design new or enhance current programs of study, so students could complete in a condensed/accelerated manner, including online learning whenever appropriate and possible. The goal was to work proactively and cooperatively with employers to help build and support a workforce pipeline as depicted in Figure 3.

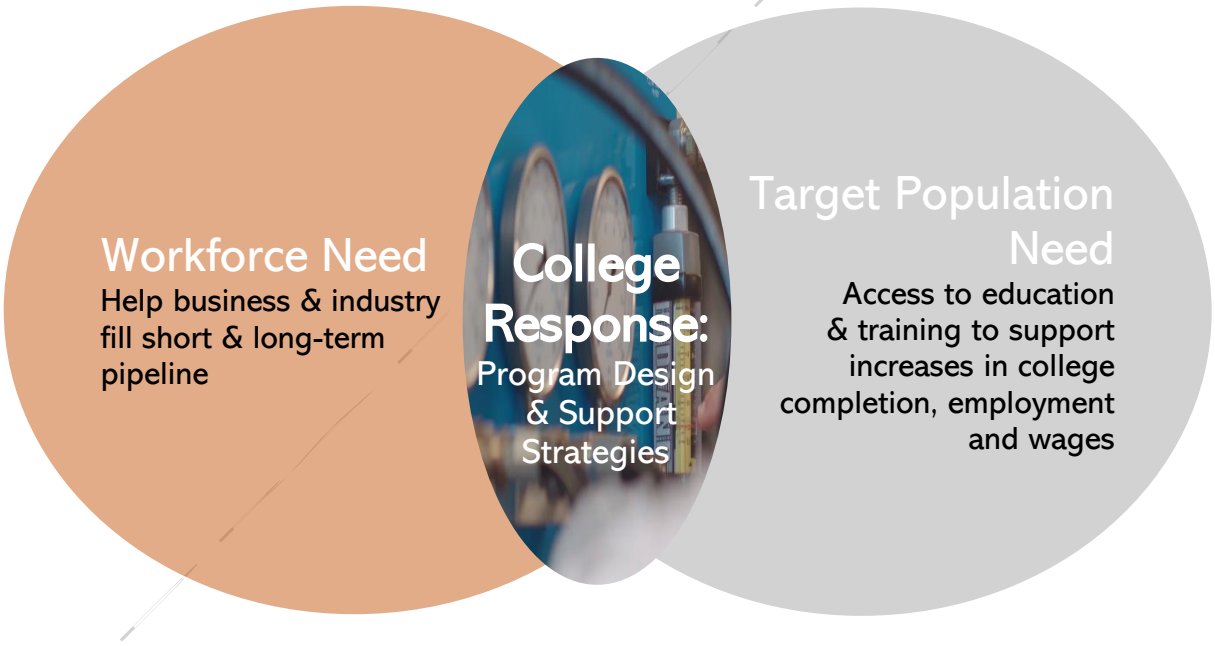


Figure 3: MoSTEMWINs Colleges' response to local workforce needs.

MoSTEMWINs' theory of change, depicted in Figure 4 below, captures how the consortium colleges envisioned the essential steps in implementing their SOW. Colleges sought to meet local workforce needs and each college worked in its own way to identify local needs using a combination of labor market information, industry and local employer input, and local Workforce Investment Board (WIB) input. Colleges then built or redesigned curriculum to meet

the needs of both employers and the target population by incorporating industry credentials which would provide students the opportunity to attain short- and/or long-term credentials.

To support the proposed theory of change, the colleges employed a stackable certificate and credential model connecting both non-credit and credit education/training components to appropriate industry certifications and providing a map for completion based on various "STEM Career Pathways." This model allows for multiple entrance and exit points giving students options for training in short increments.

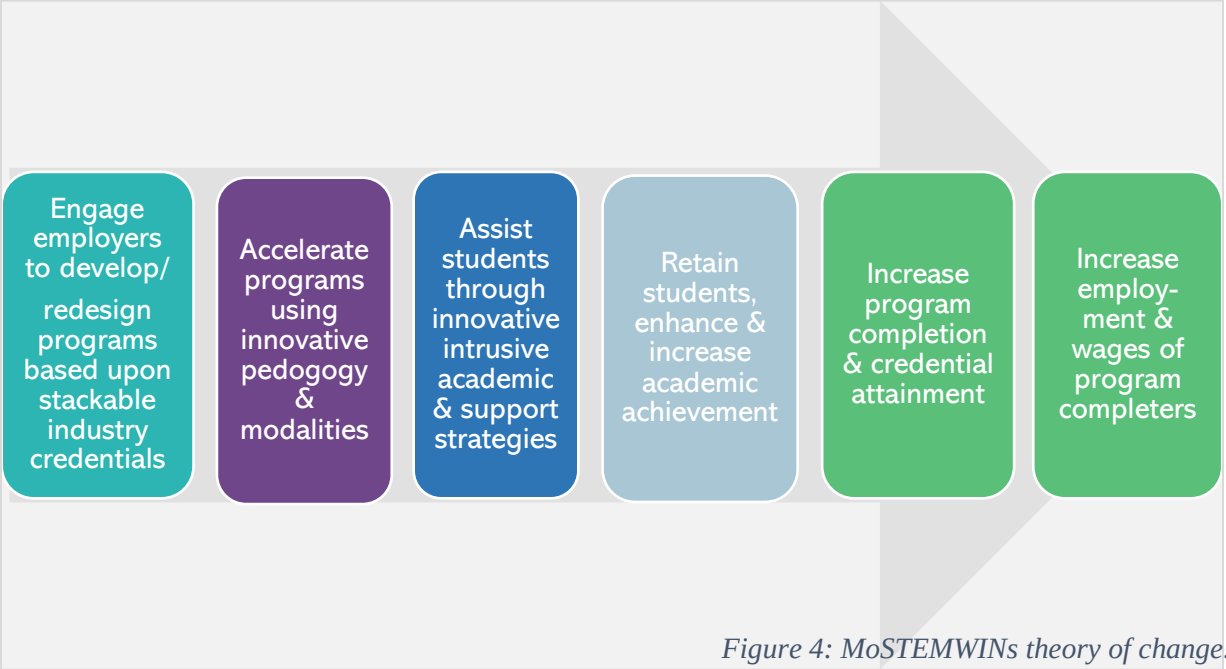


Figure 4: MoSTEMWINs theory of change.

To further support this instructional model, the colleges developed a learning framework that provides students with the basic academic skills they need to succeed through contextualized technical courses. Furthermore, based upon lessons learned during their Round One and Round Two TAACCCT grants, the colleges expanded the use of intrusive student services to appropriately onboard students into STEM programs, and support program retention and program completion efforts. Figure 5 presents a detailed logic model as constructed by the Consortium at grant onset.

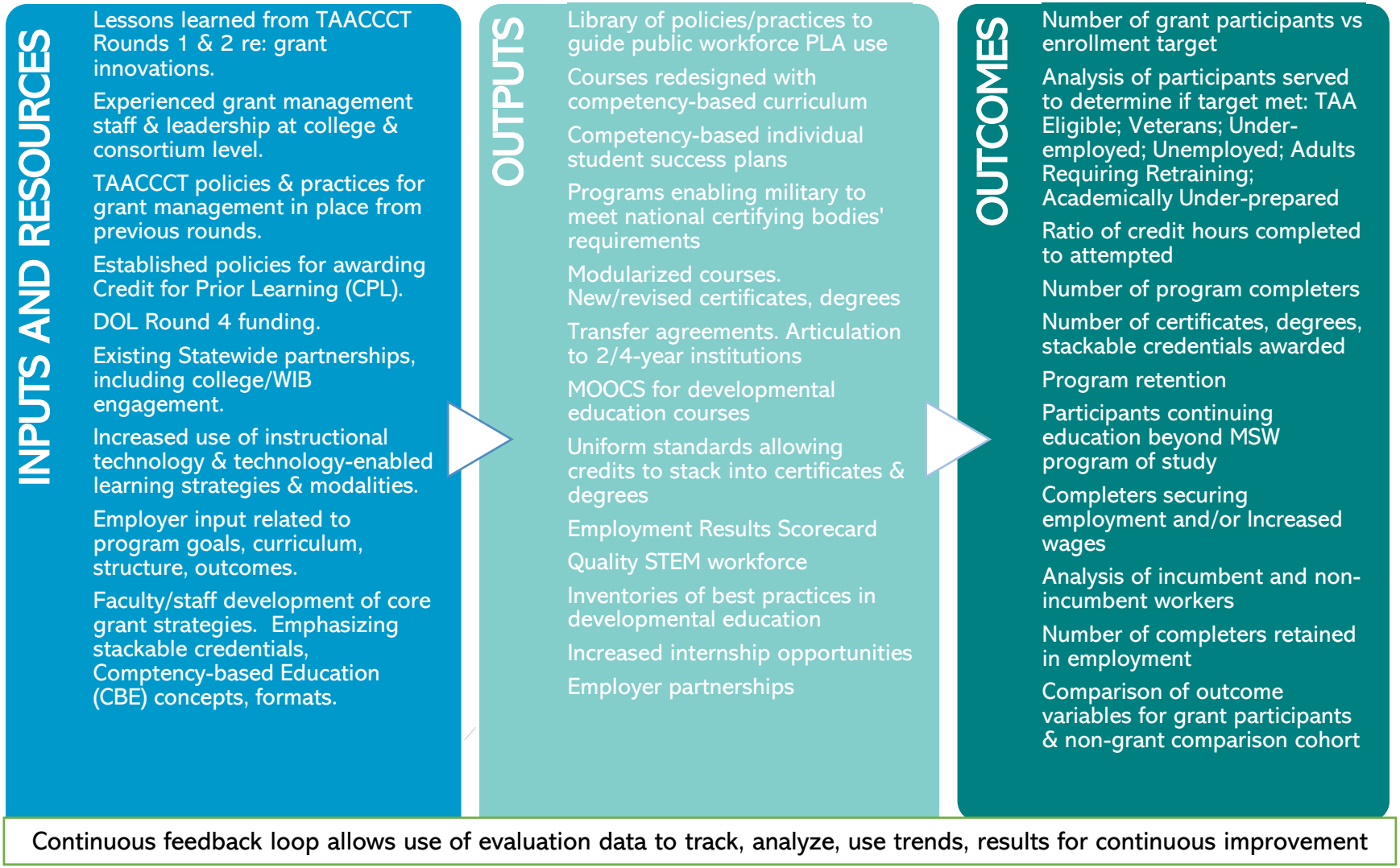


Figure 5: MoSTEMWINs logic model.

The remaining sections of this report examine DOL-required metrics and additional evaluation data to determine the extent to which MSW colleges implemented this theory of change and whether it impacted students successfully. In addition, data associated with innovations thought to hold promise for implementation, scaling, and sustainability are discussed.

In soliciting grant applications, DOL acknowledged grantees would need to emphasize institutional capacity building to meet the program goals. DOL encouraged applicants to propose ways to "expand and improve their ability to deliver education and career training programs" urging them to incorporate evidence-based design, stacked and latticed credentials, online and technology-enabled learning, transferability and articulation, and strategic alignment (*U.S. Department of Labor, ETA Solicitation for Grant Applications, Round 4---SGA/DFA PY 11-08*).

Due to DOL's expectation to build capacity while implementing grant requirements, grant leaders at each college had to design the innovation, change college processes and cultures to implement innovations, manage the grant according to DOL-compliance requirements, and achieve and track results—all within four years. Although laudable, DOL's challenge to build capacity did not always align with DOL's required reporting metrics and timeline, therefore seeming unrealistic to grantees at times. These conflicting pressures may have also limited the colleges' capacity to learn and transfer lessons learned from the grant to non-grant programs. While not intended, this inadvertent circumstance may have contributed to grant innovations being sheltered or isolated from the mainstream organization, thus diminishing potential for sustaining and scaling larger and longer-term change.

Working together, the MSW Consortium and the evaluation team adopted the following evaluation questions. This report is organized around these evaluation questions outlined in Figure 6.

1. Did MSW colleges implement programs and strategies as designed?
2. Did MSW colleges partner with employers to develop/redesign programs and to what extent were faculty and employers involved in ongoing support for students and program content?
3. What did the MSW colleges learn during implementation?
4. Did MSW programs serve the target population?
5. Did MSW participants achieve desired student outcomes and how do actual grant outcomes compare to targeted grant outcomes?
6. How do program completion and employment results compare for grant participants to non-grant students?
7. What grant strategies appear to hold promise for long-term sustainability and scaling?

Figure 6: Evaluation questions formulated by MoSTEMWINs leadership & evaluator.

The Consortium

The MoSTEMWINs consortium provided more than administrative grant support. The joint grant management approach between a host college and MCCA was new with Missouri's Round 4 grant and evolved over the first two years of the grant. In C&A's baseline evaluation report[7] it was noted that an appropriate and experienced grant leadership team was in place at MCCA and the host college, Metropolitan Community College (MCC), had designated staff to work with MCCA staff to ensure compliance with TAACCCT guidelines. At that time, MCC and MCCA were working together to develop and define specific roles and responsibilities related to such efforts. By the mid-point evaluation and continuing throughout the remainder of the project, grant leadership from both MCCA and MCC reported progress associated with their joint management efforts and saw the value of injecting a campus/college perspective into statewide and campus-to-campus continuous improvement efforts.

Campus-based leadership, staff, and faculty appreciated the consortium and especially valued the opportunity to share best practices and lessons learned among themselves. The consortium created a space/environment for statewide discussions and information sharing among community college practitioners. Specifically, campus leadership and staff note the efforts described in Figure 7 as beneficial. C&A observed a growing culture of organizational flexibility, adaptability, and confidence.

Statewide engagement of grant leadership teams.
Uniform documentation of grant implementation, compliance, finance, and overall performance management.
Statewide staff development tied to specific grant strategies.
Opportunity to interpret grant implementation and outcome data with TPE.
Access to up-to-date labor market information.

Figure 7: Statewide efforts deemed beneficial to MoSTEMWINs implementation, sustainability, & scaling.

The Missouri Community College Association leveraged current and previous consortia efforts and collaboration to support a community college, statewide strategic planning process, and the creation of a statewide Workforce Development Network designed to more fully connect community college programs and instructional strategies to statewide workforce development needs. As a result, individual colleges and the state progressed regarding the following initiatives: college-employer engagement and partnerships; career pathway development using industry-recognized stackable credentials; increased intentional student support; re-design of developmental education; and credit for prior learning.

[7] MoSTEMWINs Baseline Year 1 Implementation Evaluation Summary Report, November 2015

The creation of the statewide Workforce Development Network was a bold step for Missouri. The Network was designed to break down procedural and geographic barriers and give Missourians the skills they need to earn higher pay and provide Missouri businesses the skilled workforce they need to grow[8]. In part the Workforce Development Network was a result of State's TAACCCT efforts. As MSW progressed, college leaders consistently described how TAACCCT efforts were increasing campus-based and statewide collaboration, communication, capacity and confidence. Borrowing the words of one longtime MSW college president, we refer to this phenomenon as the "Four C's of TACCCT" (see Figure 8.). The colleges capitalized on these Four C's and worked together to create the Workforce Development Network, and more fully connect with statewide economic development entities to ensure community colleges are an integral component of local and statewide economic development efforts.

[8] Missouri Community College Association, Final Report of the Workforce Development "Big Idea" Task Force, April 2017.

MoSTEMWINs and the 4 C's of TAACCCT

Quotes from College Leadership

COLLABORATION

We connected instruction and student support functions. The grant provided Missouri community colleges with a platform for sharing content, systems, and best practices.

MCCA colleges have developed a "stronger together" appreciation of each other. Learning from colleagues throughout the state has expanded and help strengthened CTE throughout the state.

COMMUNICATION

We increased our internal communication and directed efforts to more fully connect instruction to student services, and non-credit workforce development to the standard credit operation.

We also increased our conversations and sharing of ideas with other Missouri community colleges. It seemed like the more we shared, the more we learned.

CAPACITY

We have increased our capacity to develop and implement stackable credentials, modularized curriculum and have changed the face of our CTE programs.

MoWINs allowed us to take workforce development to a larger scale, to expand & experiment with non-credit workforce training programs and systematically collect and use data for continuous improvement.

We recognize the need for program options and respect the needs and challenges non-traditional students bring.

CONFIDENCE

We are increasingly becoming more comfortable as a community & regional resource and as a driver of economic development.

We realized MoWINS was about innovation and experimentation and we needed to tie that to our strategic planning process with a goal of weaving those best practices into our day to day operations.

Figure 8: The 4 C's of TAACCCT as described by college leadership.

EVALUATION QUESTION 1:

Did MoSTEMWINs colleges implement programs & strategies as designed?

Missouri colleges designed MoSTEMWINs to cover a broad range of programs within the STEM umbrella. Table 1 outlines each college's programs by industry cluster and shows the information technology and advanced manufacturing sectors held the bulk of MSW programs. One college offered a transportation-related program (truck driving), three colleges offered programs in the life sciences sector and four colleges offered health science-related programs.

Programs in the Information Technology sector varied both in length and rigor and ranged from a very short (one week) computer concepts course to one-year certificate programs. Colleges were more consistent in the Advanced Manufacturing sector where four offered a Certified Production Technician (CPT) program and another offering a variation of the CPT program, Mechatronics.

Table 2 lists each of the programs offered in MSW and shows the most common program was Certified Production Technician. Three additional programs were offered by two schools: certified logistics technician, medical assistant, and pharmacy technician. The remainder of programs were offered by a single MSW college. Many of the programs were also offered at other consortium colleges but not as part of the MSW grant.

Although the programs differed, the colleges chose from the same set of strategies to innovate program design, delivery, and student supports. The combination of differing industries, differing programs of study, and differing college contexts resulted in some variation in how MSW strategies were implemented across the consortium. For example, flexible delivery could mean that a college implemented any or all of the following: evening and/or weekend offerings, online course work with in-person and hands-on labs, modularized coursework, contextualized math, concurrent developmental coursework, or adjunct faculty with current industry experience.

Table 1. Target Industry Clusters for MoSTEMWINs Programs of Study by College

Industry Cluster	CC	ECC	JC	MAC	MACC	MCC	NCMC	OTC	SCC	SFCC	STCM	STLCC	TRC
Information Technology		✓	✓			✓			✓		✓	✓	
Health Sciences				✓		✓				✓		✓	
Life Sciences			✓					✓				✓	
Manufacturing				✓	✓		✓		✓			✓	✓
Transportation	✓												

Table 2 looks at the MoSTEMWINs' programs of study within in cluster and shows which colleges offer each program as well as the credit status of each program. Within the manufacturing cluster, the same program is offered as credit bearing at some colleges while non-credit at others illustrating the multi-faceted approaches colleges deployed to meet student and employer needs. Overall, 70% of the programs were offered as credit and 30% offered in a non-credit format.

Table 2. Programs of Study by Cluster, College, and Credit Status

	Program	Mineral Area	Moberly Area	North Central	St. Charles	St. Louis	Three Rivers
Advanced Manufacturing	Certified Logistics Technician	Credit			Noncredit		
	Certified Production Technician	Credit		Credit			Noncredit
	Certified Production Technician - Green Production	Credit					
	Connector & Conductor	Credit					
	Industrial Hydraulic Mechanic	Credit					
	Mobile Hydraulic Mechanic	Credit					
	Mechatronics	Credit	Credit				
	Pneumatic Technician						
	Precision Machining					Credit	
	Welding				Noncredit		

Table 2 continued. Programs of Study by Cluster, College, and Credit Status

	Program	Jefferson	North Central	Ozarks Technical	St. Louis
Math/Science	Chemical Laboratory Technician			Credit	
	Health Professions Tutoring & Resource Lab	Noncredit			
	Life Science Lab Assistant				Credit
	MoSTEMWINs Portal				Credit & Noncredit
	UP Program		Noncredit		

Table 2 continued. Programs of Study by Cluster, College, and Credit Status

	Program	East Central	Jefferson	Metropolitan	St. Charles	State Technical	St. Louis
Information Technology	Computer Concepts					Noncredit	
	Computer Information Systems	Noncredit					
	Computer Programming				Credit		
	Computer Supplemental Instruction			Noncredit			
	Electronics Technology Certificate		Credit				
	Information Technology Help Desk						Credit
	IT Project Management				Credit		
	LaunchCode RebootU						Noncredit

Table 2 continued. Programs of Study by Cluster, College, and Credit Status

	Program	Crowder
Transportation	Transport Training	Credit

Table 2 continued. Programs of Study by Cluster, College, and Credit Status

	Program	Mineral Area	Metropolitan	State Fair	St. Louis
Health Sciences	Certified Nurse Assistant				Noncredit
	Community Health Worker				Noncredit
	Dental Hygiene			Credit	
	Diagnostic Medical Sonography			Credit	
	Health Information Management			Credit	
	Licensed Practical Nurse			Credit	
	Medical Assistant		Noncredit		Noncredit
	Nursing Assistant			Credit	
	Occupational Therapy Assistant			Credit	
	Patient Care Technician				Noncredit
	Pharmacy Technology	Credit		Credit	
	Radiologic Technology			Credit	
	Registered Nurse			Credit	

Although all 13 partner colleges worked to address each of the three primary strategies, (Accelerate Entry, Create Clear Paths to STEM, and Improve Employment Attainment), not every college undertook each activity within each primary strategy. To further explore college efforts related to strategies and activities, C&A collected data from each college to evaluate the extent to which a college implemented strategies and activities. The scale outlined in Table 3 was used to evaluate such implementation.

Table 3. Self-assessment of Implementation Scale

Rating		Definition
0	Not Planned	activity not relevant to this college's MSW grant.
1	Planning but Not Started	activity being planned as part of the grant, but implementation has not begun.
2	Advancing Implementation	implementation is occurring on an on-going basis; however, changes or advancements will continue during the grant.
3	Mature Implementation	implementation has reached the highest level and no additional changes or modifications are expected during the grant.
4	Sustaining Implementation	the college has made a formal, tangible commitment of resources (budget, people, facilities) to continue this activity beyond the grant.

Consortium results from this data collection are presented below. Figure 9 depicts the average implementation score for each of the 13 colleges' self-assessments of the activities attendant to accelerating entry (Strategy 1) and shows the extent to which colleges view themselves as having implemented each activity.

Since the MSW interim evaluation report, the colleges continued to implement each activity so that by grant end, the average implementation rating for each activity ranged between mature and sustaining implementation. In particular, the activity regarding redesign of developmental education has the highest sustaining rating. The Missouri Department of Higher Education (MDHE), as well as state legislators, and other stakeholders have identified developmental education improvement and redesign as a key priority. Missouri's community colleges have responded to this call, and colleges noted how TAACCCT grants allowed them to experiment with redesign efforts, so they were in a better position to use evidence-based practices/strategies to implement redesign and improvement efforts.

As noted in the interim evaluation report, although grant programs developed curriculum designed around employer validated competencies, few programs employed a full competency-based education (CBE) model which allowed students to progress based upon competency mastery. Jefferson College adopted a lead role to identify, research, and examine the potential benefits and challenges associated with CBE and produced a Competency-Based Education Discovery Document. Jefferson College shared this document with other partner colleges for review and further discussion.

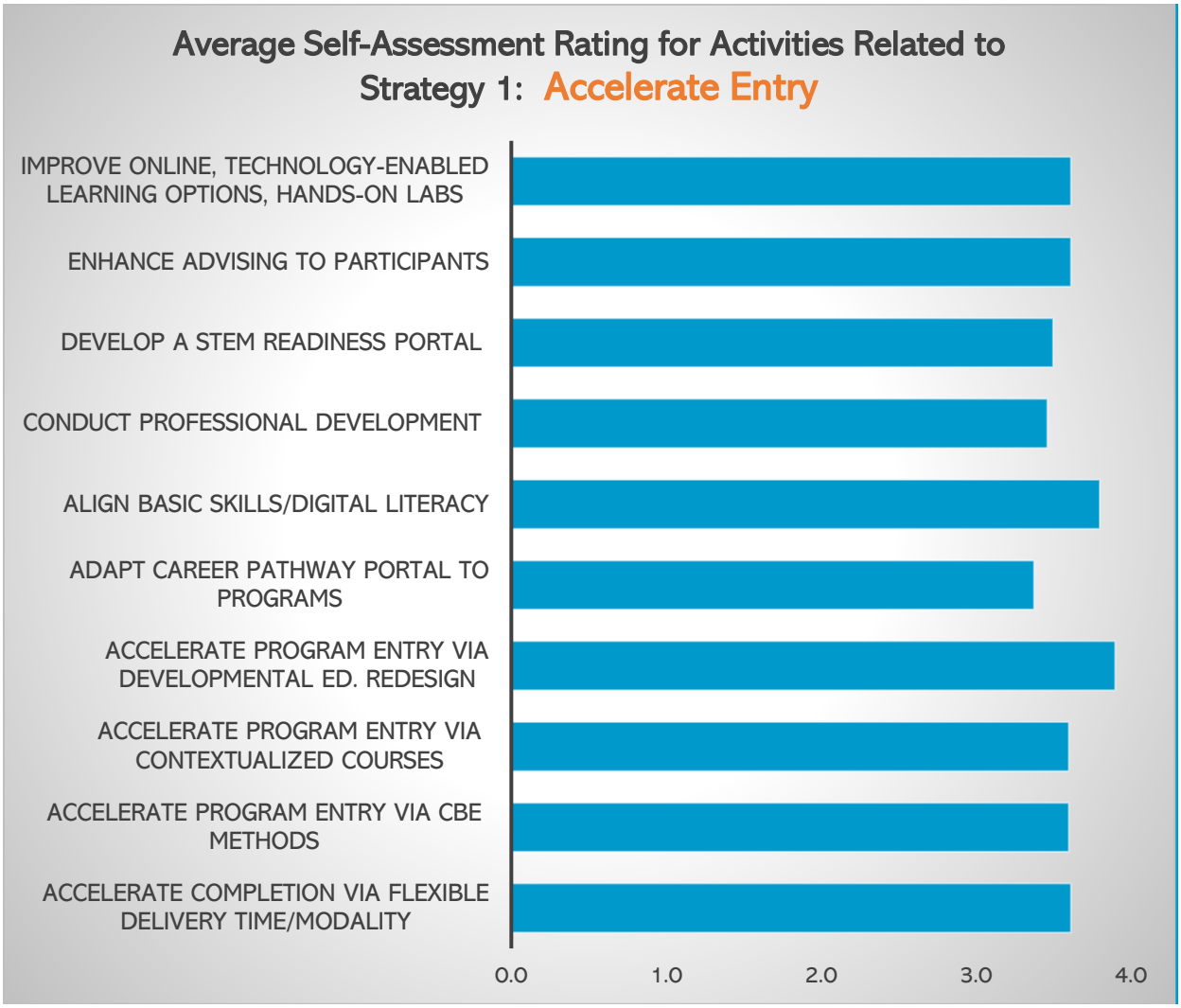


Figure 9: Average self-assessment rating by MoSTEMWINs colleges implementing Strategy 1 activities.

To further explore college implementation of accelerating entry activities, C&A used each college's implementation ratings to help guide campus site-visits and related interviews with faculty, staff and employers. By triangulating data sources (campus reports, site-visit observations, and campus interviews), C&A acquired a more comprehensive understanding of colleges' efforts to advance implementation from initial to more mature stages. This analysis brought to light the results displayed in Figure 10.

Accelerating Entry

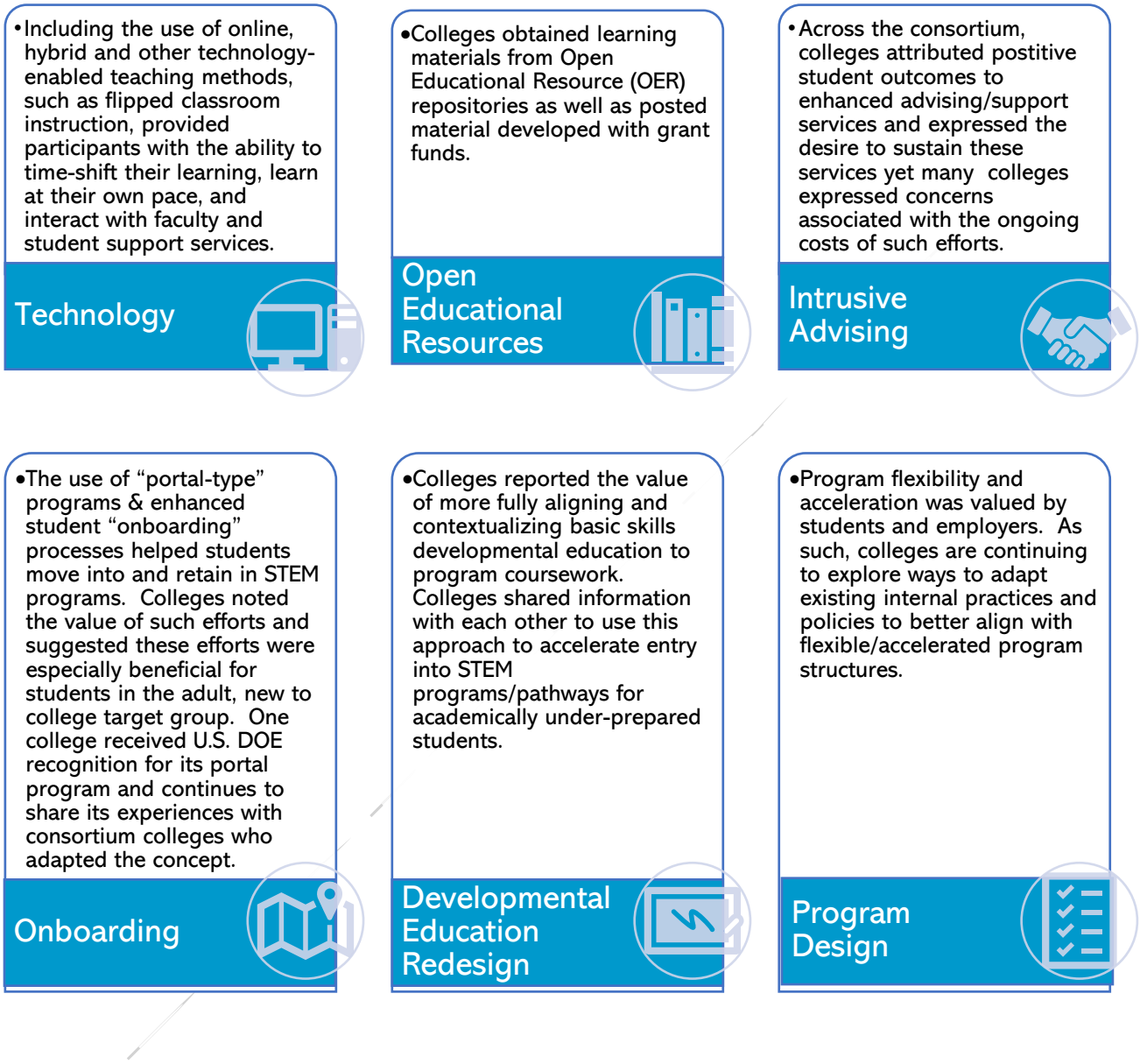


Figure 10: Observed efforts toward accelerating entry.

The second strategy for MoSTEMWINs is to Create Clear Pathways to STEM Careers by expanding access to/developing new stacked and latticed credentials in programs to meet employer needs. Figure 11 shows the average MSW colleges' final self-assessment ratings for each of the activities associated with this strategy and indicates colleges view themselves as having reached mature to sustaining implementation.

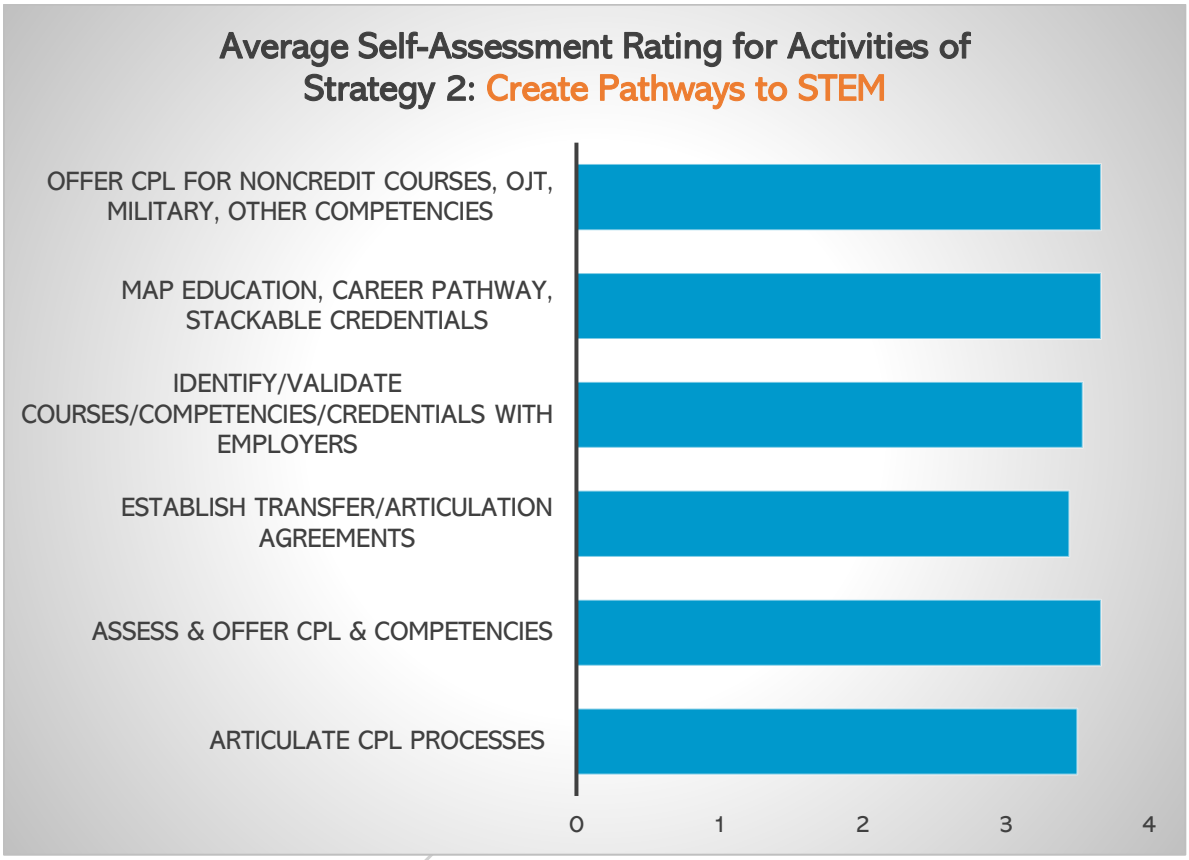


Figure 11: Average self-assessment rating by MoSTEMWINs college implementing Strategy 2 activities.

The driving design factor associated with this strategy was to ensure "MoSTEMWINs activities result in stronger career pathways for participants, with clearly stacked and latticed opportunities. Each member college has developed strategic plans of action for their targeted programs of study based on differences in regional employer needs." (MoSTEMWINs project narrative).

To more fully explore consortium efforts related to this strategy, C&A again triangulated data sources (campus reports, site-visit observations, and campus interviews), to gain a deeper understanding of colleges' efforts to advance implementation to more mature stages. This analysis revealed the key points depicted in Figure 12.

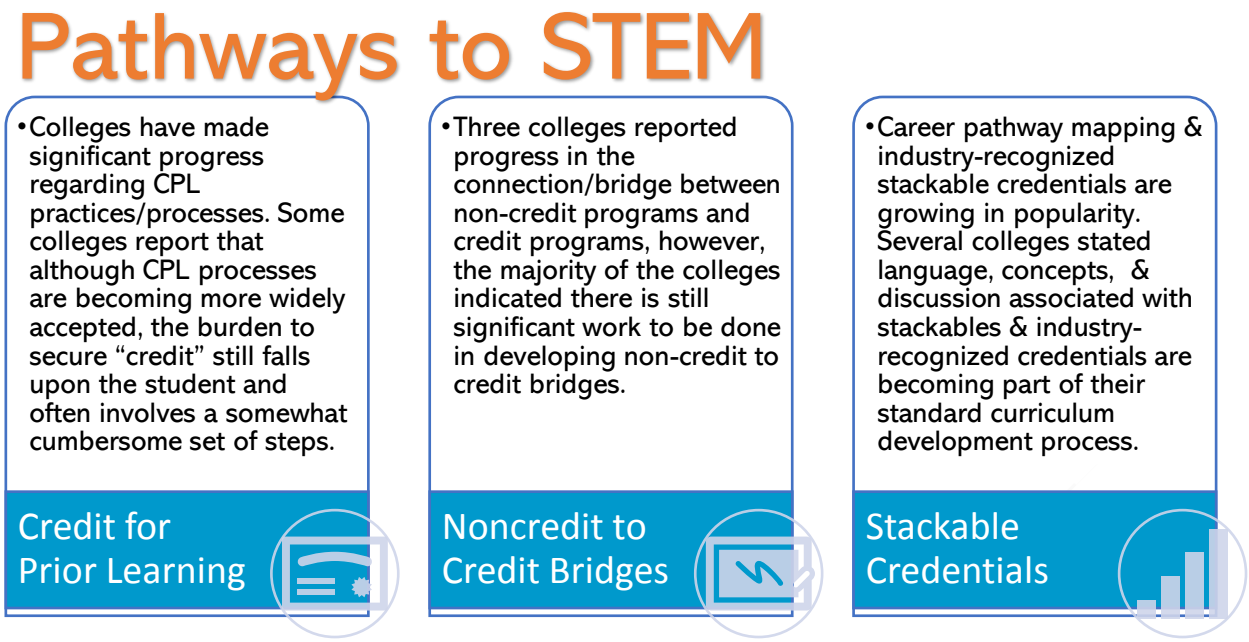


Figure 12: Observed efforts toward creating pathways to STEM.

With regard to improving employment attainment, Strategy 3, the project narrative states: "Strategy 3 focuses on aggressively seeking out employment and internship opportunities and connecting participants to them." Figure 13 below depicts the colleges' final self-assessment of the implementation of each of the activities associated with improving employment attainment. MSW colleges rate implementation as mature to sustaining.

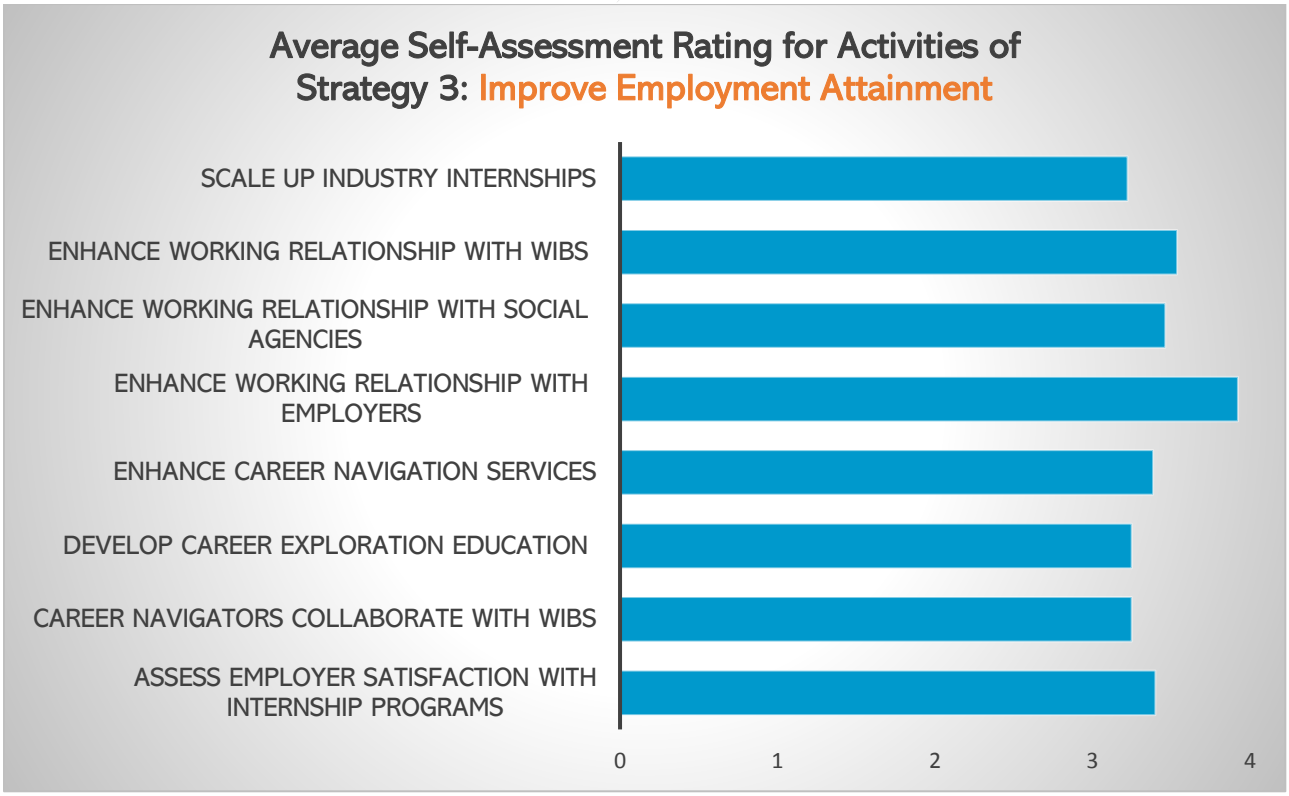


Figure 13: Average self-assessment rating by MoSTEMWINs colleges implementing Strategy 3 activities.

Regarding career exploration education and career navigation services, most colleges employed the same navigator/advisor to provide services to support initial recruitment and program onboarding, program retention and completion, and employment assistance, while others had separate navigator/advisors focusing primarily on career services and job placement. Navigators/advisors interviewed by C&A all reported the use of labor market information (LMI) information and the value of working with faculty and employers to develop mock interviews, job fairs, and seminars related to resume writing, business-etiquette, and the importance of "soft-skills". The inclusion of soft-skills/appropriate work behaviors and expectations was noted as especially important by students and perspective employers. Figure 14 outlines the college's efforts regarding Strategy 3 activities.

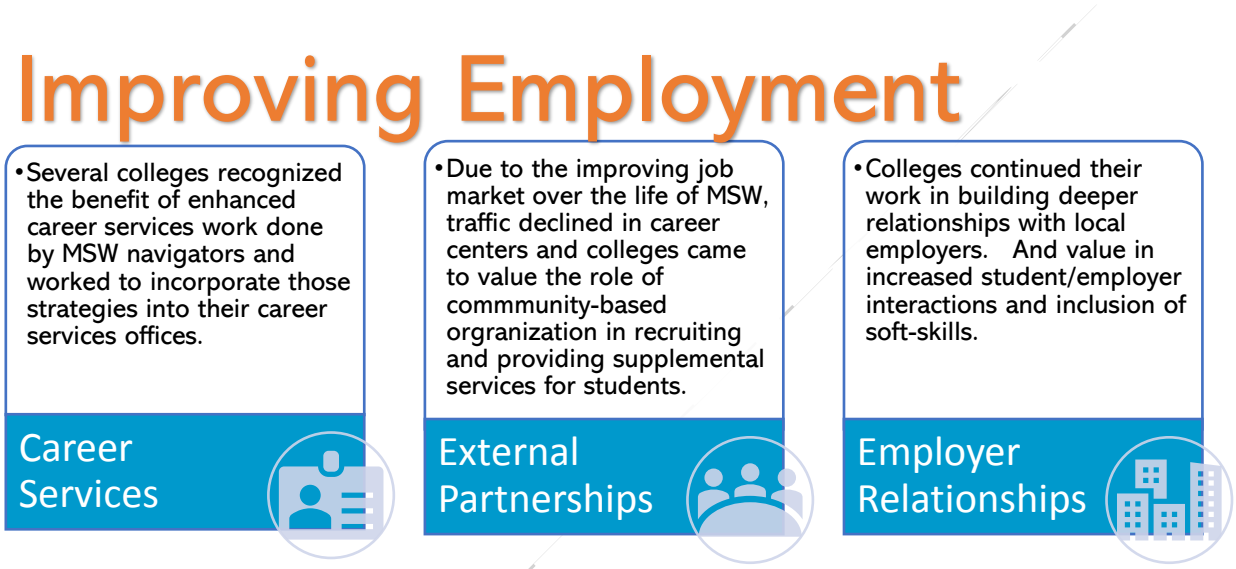


Figure 14: Observed efforts toward attaining employment for students.

Interviews with college personnel and staff at local career centers/Workforce Investment Boards (WIBs), revealed relationships vary across state. Most colleges report relationships have improved since the Round 1 TAACCCT grant. College and WIB staff point to the value of one-on-one personal connections and are actively working to support the creation and development of these types of relationships. Staff from both areas agree the primary and important role of the WIB was to provide supportive services.

EVALUATION QUESTION 2:

Did MSW colleges partner with employers to develop/redesign programs and to what extent were faculty and employers involved in ongoing support for students and program content?

Colleges reported partnering with more than 60 employers and/or community-based organizations to develop, launch, and support grant programs of study. During interviews with the TPE, employers indicated their relationship with the college was more extensive under MSW than it had been in employer program advisory councils for existing career and technical education (CTE) programs. In addition to using employer/community engagement for program and strategy development, colleges have and continue to work with employers and community partners to support students from initial recruitment into and throughout programs to completion and employment. Such efforts demonstrate lessons learned from previous TAACCCT efforts and are expected to help students more fully connect to a STEM career pathway and employment.

Grant staff from numerous colleges referenced the value of the TAACCCT Round 1 and 2 Employer Engagement Taskforce report[9], which prompted colleges to be more proactive in reaching out to prospective employer partners at the planning and initial implementation stages of the MSW grant. Colleges reported that this proactive, ladder approach to employer engagement[10] appears to be a best practice that can be adapted and sustained by non-grant career and technical education programs.

By mirroring their proactive engagement efforts with employers and students, colleges became increasingly aware of the key role they played in serving as the nexus between what employers need and what students need to meet those local employer needs. Colleges focused on how to

[9] MoWINs White Paper Employer Engagement Task Force Report, https://www.skillscommons.org/handle/taaccct/3334

[10] A Resource Guide to Engaging Employers, Jobs for the Future, 2015

build programs to support local and regional workforce development pipelines. Figure 15 presents selected comments from college representatives on the progress made and lessons learned regarding employer engagement.

During the final campus site visits, C&A interviewed 33 employer partners. Employers expressed satisfaction with the college's efforts to reach out and engage with them to design and/or modify program curriculum and related program competencies. In addition, during interviews with the third-party evaluators employer partners who have hired MSW students reported being more than satisfied with the overall employment preparation of the MSW participant.

We forged a new way of engaging with employers. We developed collaborative relationships with them and truly listened to what their training needs were and developed pathways to fill those gaps.

Commitment to strategic employer engagement continued under the MSW grant. The employer engagement model depends on a continuous feedback loop with ongoing employer guidance in program development, recruitment, program assistance, participant assistance, and employment and talent acquisition. The model relies on the use of labor market information and analysis of employer survey data to assess current and future job demand and shifts in addressing skill shortages.

Employer engagement requires systematic attention. Must be intentional, continuous. The employer must learn to trust that the college is responsive to needs and produces quality completers.

Figure 15: MSW employer engagement in practice.

To gain a deeper understanding of college-to-employer engagement, C&A asked each college to rate grant stakeholders over a number of key roles. Table 4 displays the average engagement score of grant stakeholders as well as the activity with the highest ranking for each stakeholder group. Colleges used the following scale to complete this rating:

Not Involved (0),
Low Engagement (1),
Medium Engagement (2),
High Engagement (3).

Table 4 shows colleges rated faculty with the highest engagement and students with the lowest. The highest rated activity for each group aligns with the role one would expect as employers were most associated with validating workforce needs, leadership with sustaining innovations, and WIB with providing support services.

Table 4. MoSTEMWINs Stakeholder Roles

Stakeholder	Average Engagement Score	Role with Highest Score
College Leadership	1.8	Work to Sustain/Scale Innovations
MoWINs Project Leaders	2.4	Assist with Program Design
Faculty	2.6	Participate in Curriculum Development Validate Curriculum Identify Necessary Skills, Competencies
Student Support Staff	2.0	Provide Support Services
Students	1.5	Validate Curriculum
Employers	2.3	Identify Industry Workforce Needs
WIB, Career Center	1.9	Provide Support Services
Other Educational	1.7	Provide Intern/Externships/WBL

Figure 16 depicts the colleges' self-assessment of stakeholder engagement across selected roles and shows the average engagement score for each activity. Activities with the highest level of engagement were identifying workforce needs, sustaining innovation, and providing support services to students. Consistent with the interim evaluation, providing internships and financial support continue to have low levels of stakeholder engagement. As noted in the interim report, several colleges have examples of work-placed learning in place, others report difficulties in getting employers to provide work-based learning opportunities while others report having difficulty getting students to participate in internships. Colleges reported internships were often not conducive to the needs of adult-learners, many of whom were already employed but seeking to upgrade their skills. A positive example in this area is Jefferson College, which heeded the recommendations of the Employer Engagement Taskforce and assembled a package to help employers develop internships.

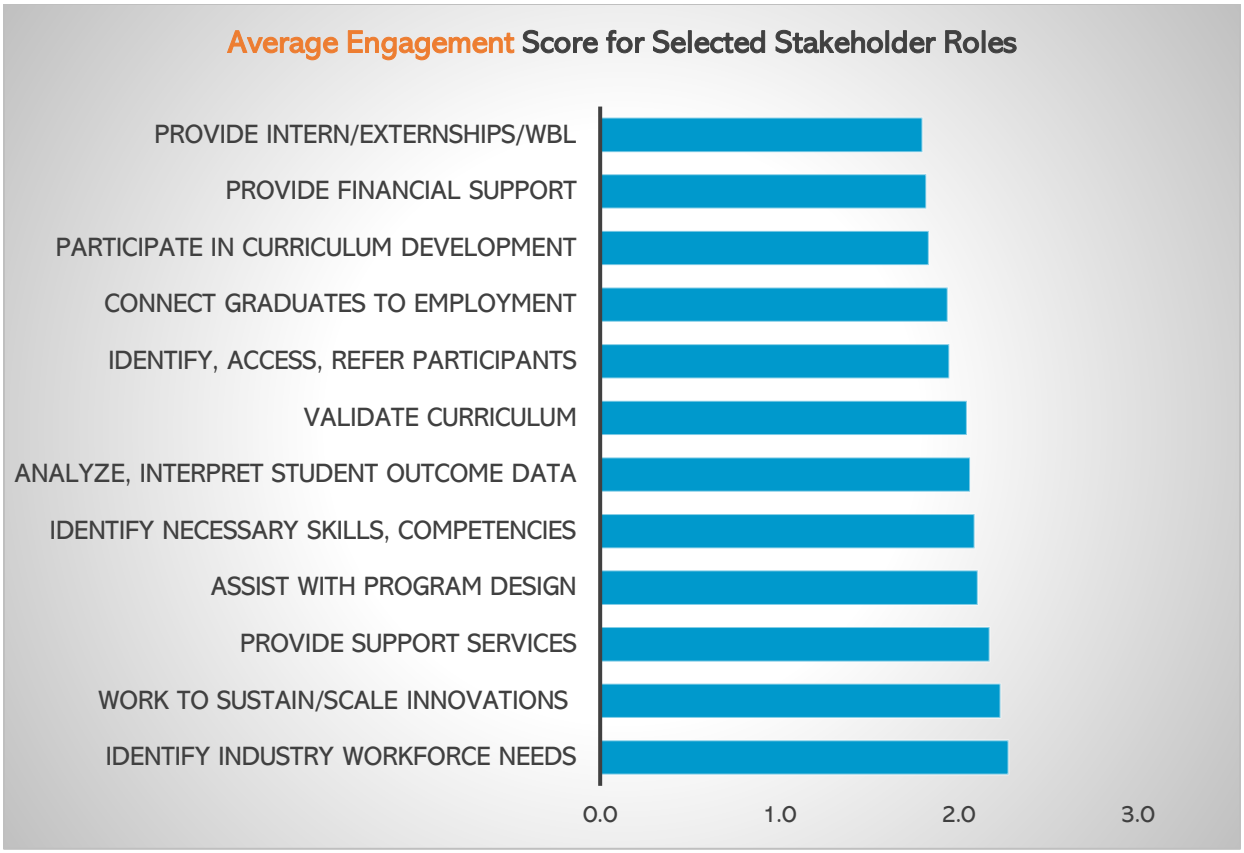


Figure 16: Average MoSTEMWINs stakeholder engagement as self-assessed by colleges.

Employers were surveyed during the fourth year of the grant to assess their level of satisfaction with the colleges' efforts and with the completers hired. Employers rated themselves on a scale ranging from Very Satisfied, More than Satisfied, Satisfied, and Less than Satisfied. Forty-three employers representing ten MSW colleges responded to the survey and the results are shown in Figures 17 and 18. Over 65% of the employer respondents rated themselves as Very Satisfied or More than Satisfied with the MSW completers or students they had hired.

Figure 17: MoSTEMWINs employer survey results.

Employers were also asked about their satisfaction with their college's efforts across selected activities and those results are presented in Figure 18. Again, 43 employers representing ten MSW colleges responded to the survey. The employers were asked to rate their level of satisfaction on a five-point scale ranging from 1, not satisfied at all, to 5, very satisfied. Survey results show employers were more than satisfied for all activities.

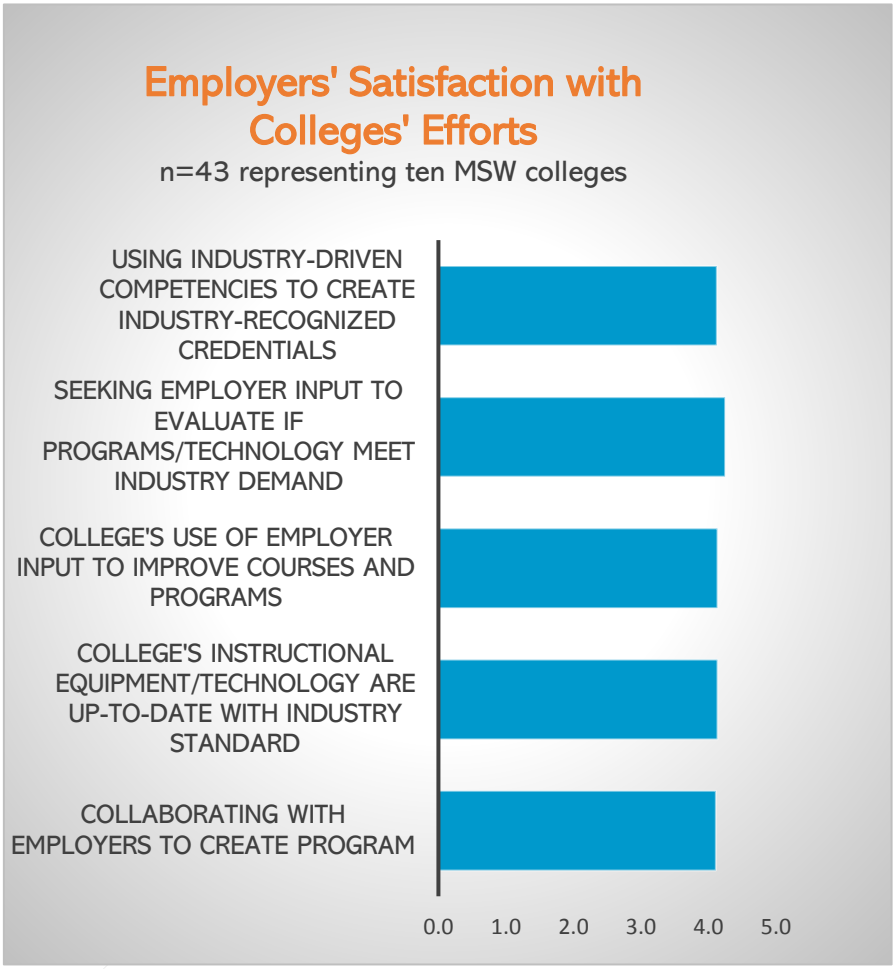


Figure 18: MoSTEMWINs employer survey results.

EVALUATION QUESTION 3:

What did colleges learn during program & strategy implementation?

Using data from campus site visits as well as MCCA's data collection system, we can validate the 13 partner colleges are providing instruction through 40 programs of study. As of the writing of this report, grant participant enrollment stands at 2,935[11]. Forty-three percent of students are enrolled in a credit program and 57% are enrolled in a non-credit program.

As they implemented MSW strategies, colleges recognized the importance of actively engaging with employers to develop and support programs of study and the need to proactively work to recruit students and continuously engage students in instructional and student support services. Colleges also began to see that it was often a combination of strategies, rather than one over-riding intervention that led to student success in the journey from recruitment to program completion onto employment. This understanding helped colleges change their conceptual framework related to how they interacted with students, especially students in the adult, no-previous college target group. It was not enough to have quality programs and services. Colleges had to aggressively work to make sure employers continued to support quality programs and students participated in services designed to help them complete their program of study and secure employment. As a result of this new conceptual framework, partner colleges are seeking to become more "student-ready".

Using data from campus site visits and interviews from campus faculty and staff, we operationalized this new conceptual framework as a continuous process involving multiple strategies/activities to support initial recruitment, program enrollment and retention, and onto program completion and employment. We described this process as the F.O.R.C.E. model outlined in Figures 19, 20, and 21.

[11] Data source MCCA ETO data collection system, July 1, 2018

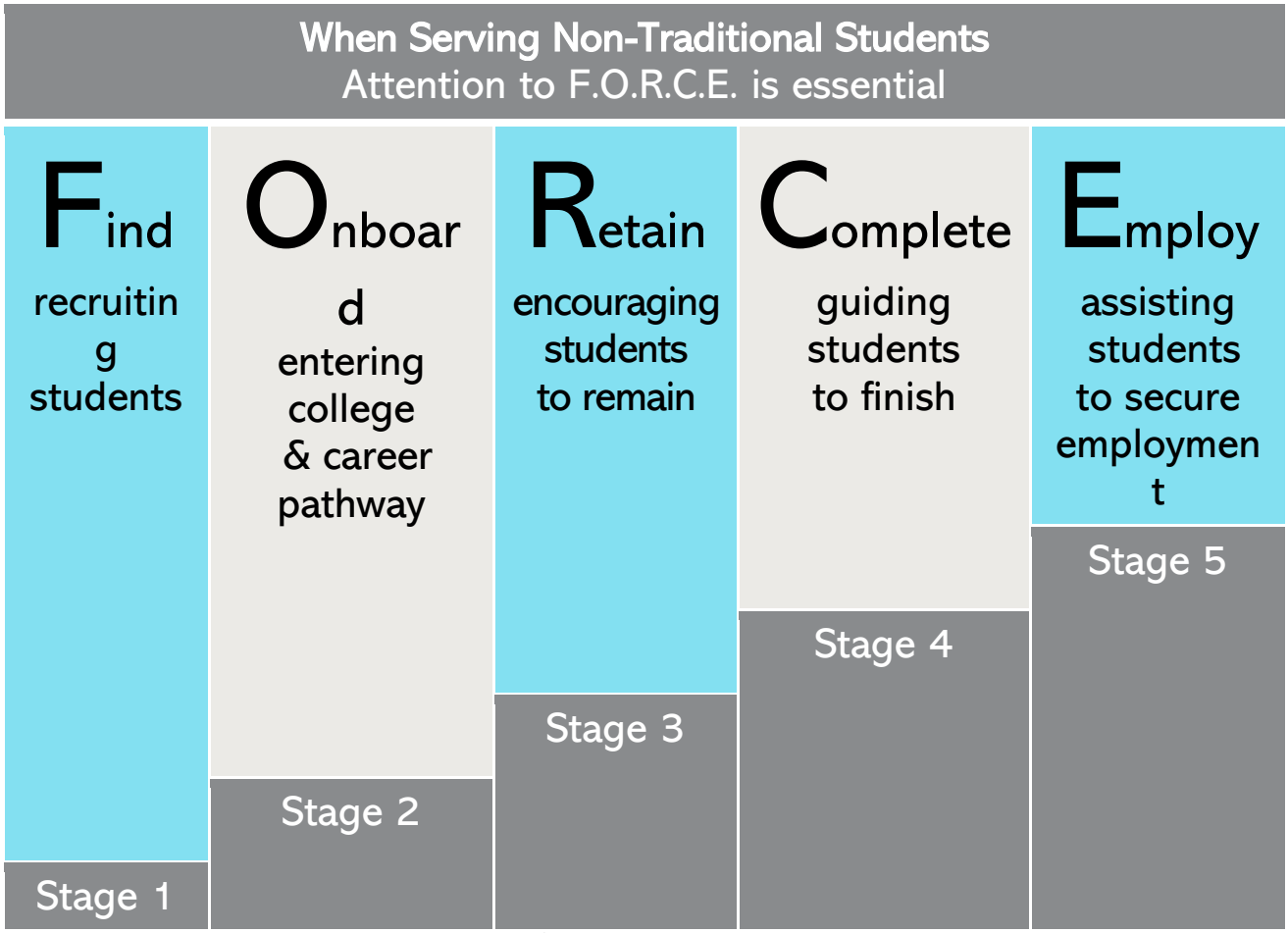


Figure 19: MoSTEMWINs framework for serving non-traditional students.

As outlined above, MoSTEM colleges built programs of study to serve the needs of local employers as well as to best suit the needs of adult students. Over the course of their previous TAACCCT experience, colleges found that many students benefited from additional supports. Figures 20 and 21 depict the methodology of MoSTEM colleges as they designed and implemented these student supports. Colleges helped students learn about programs of study and career pathways; onboarded students into college and helped them navigate the multitude of college processes; provided academic and personal supports to help students progress through challenging curriculum while managing challenges of adult life; helped students complete programs; and assisted students as they applied for employment.

Figure 20 shows the activities perceived as most impactful across MSW colleges as they recruited and onboarded students. Figure 21 shows the activities perceived as most impactful across MSW colleges as they helped students to remain in and complete programs and then secure employment.

Find, Onboard into Program

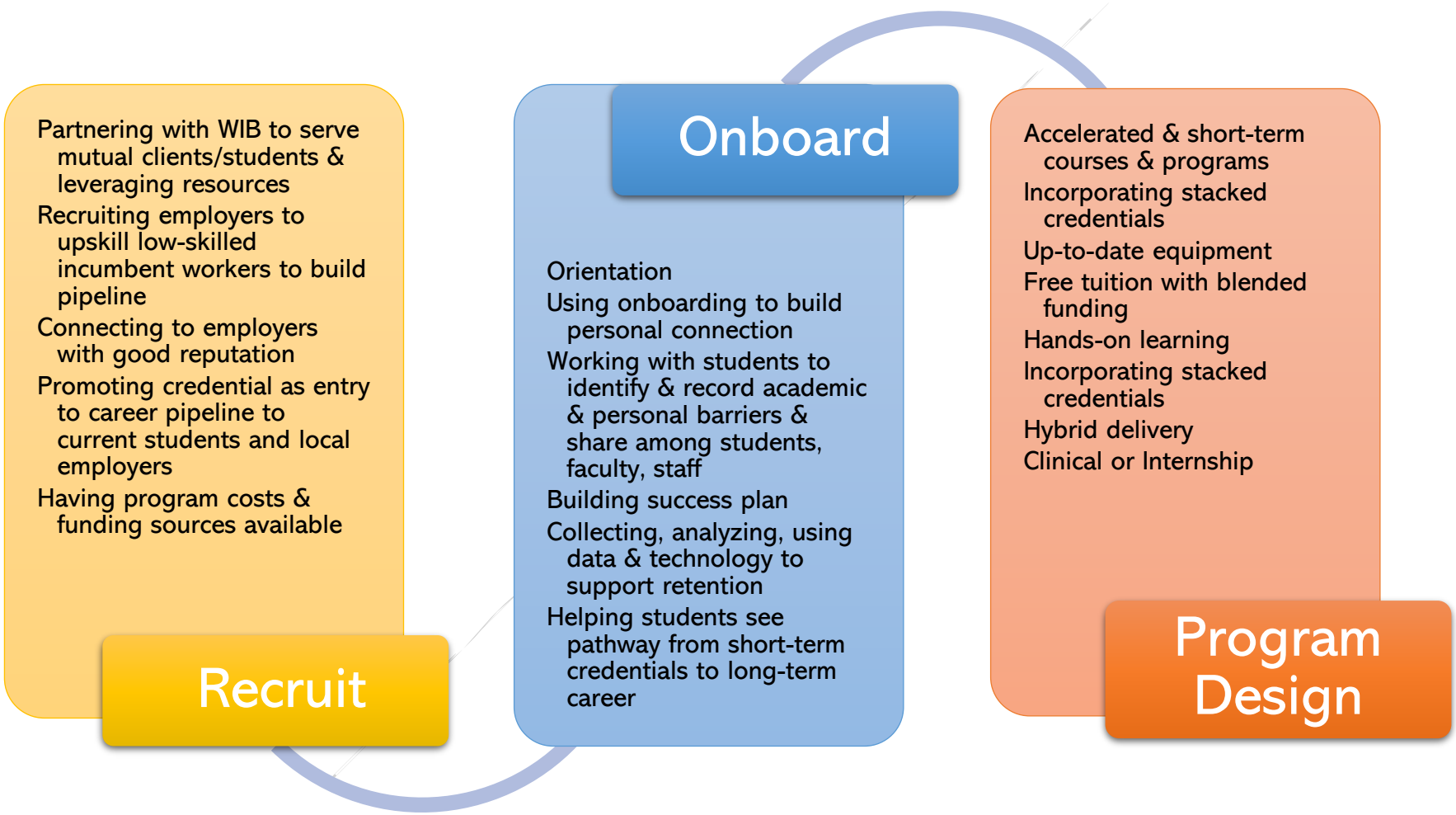


Figure 20: MoSTEMWINs most impactful activities regarding recruitment, onboarding, and program design.

Retain, Complete, Employ

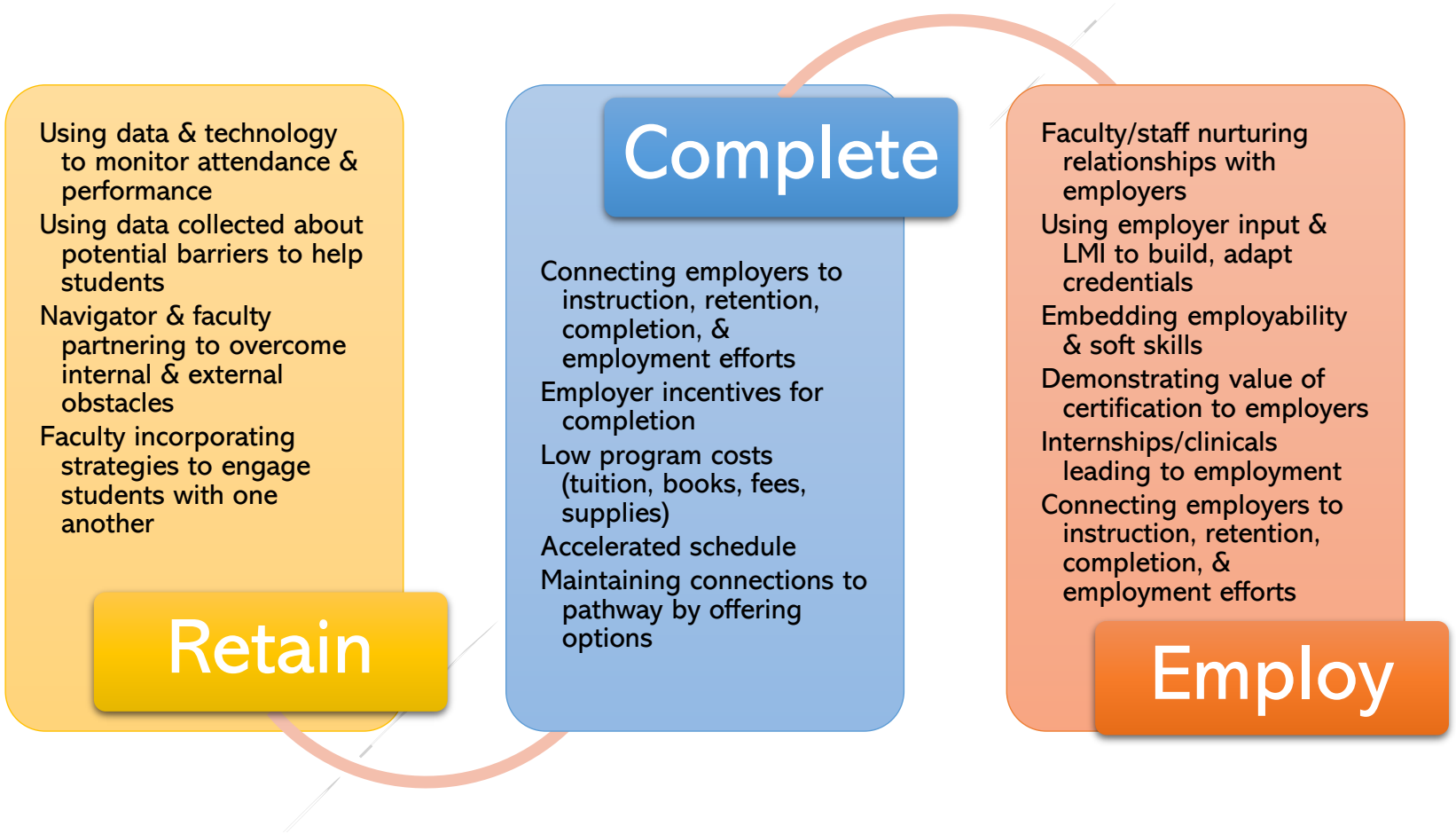


Figure 21: MoSTEMWINs most impactful activities regarding retention, completion, completer employment.

Grant leadership at the local college level as well as college presidents and other representatives from executive leadership stressed the lessons learned and progress made over their involvement in MoWINs. Figure 22 displays college leadership comments regarding lessons learned. Colleges increased their understanding of the barriers faced by adult-learners as they enroll and onboard into the college experience. Colleges saw these as distinct but related to challenges these students may face in managing academic content and juggling college work with adult responsibilities. As a result, colleges designed strategies to assist students throughout the process.

MoWINs laid the foundation for us to better understand barriers and life issues non-traditional students face as they pursue post-secondary credentials.

MoWINs allowed for a true paradigm shift related to instructional teams. The funding was a catalyst for the College to experiment, improve, & scale the shift during a time of reduced state funding.

MSW allowed us to experiment with stackable credentials connected to career pathways. We are learning to spread this concept to our CTE programs.

We learned to intertwine noncredit & credit, alternative modalities, and financial aid & how these work for the unemployed and under-employed.

Figure 22: MSW college leadership quotes on lessons learned regarding finding, onboarding, program design, retaining, completing, and employment.

George Kuh's 2018 update of *High Impact Educational Practices: What They Are, Who Has Access to Them, and Why They Matter*[12] identifies 11 high impact practices and explores the relationship between the practices and learning gains. The Center for Community College Student Engagement suggests these areas can serve as a foundation for additional strategies connected directly to community college & non-traditional students. Through their MoSTEM initiatives, the colleges worked on a suite of reforms related to Kuh's work across a range of policies and stakeholders.

Major players in the reforms were the faculty who were asked to design and/or implement many of these innovations. Late in 2017 faculty were surveyed to assess their involvement in these reforms as well as their perception of the impact of the reforms on student success. Ninety faculty from 13 colleges responded to the survey. The reforms were grouped into four areas:

[12] Kuh, George: High-Impact Educational Practices: What They Are, Who Has Access to Them, and Why They Matter, https://www.aacu.org/publications-research/publications/high-impact-educational-practices-what-they-are-who-has-access-0 Source: Center for Community College Student Engagement: https://www.ccsse.org/docs/Matter_of_Degrees_3.pdf

employer related activities, curriculum related activities, student-support related activities, and employment of completer related activities.

Figures 23-26 examine the extent to which faculty were involved in such strategies, as well as how faculty see the relationship between the use of these strategies and improved student outcomes. Faculty rated their level of involvement on a four-point scale ranging from None or Little Involvement, 1; Somewhat Involved, 2; Moderately Involved, 3; and Very Involved, 4. Additionally, faculty rated their perception of the activity's impact on student success on a four-point scale ranging from Little or No Impact, 1; Some Impact, 2; Moderate Impact, 3; and Significant Impact, 4.

Regarding employer-related activities presented in Figure 23 faculty rated each of the activities as having strong positive impact on student success but on average are only somewhat involved in these activities. Of the four areas, employer-related activity is the area with the largest discrepancy between involvement and perceived impact. For the most part, colleges did engage with employers but often it was someone other than faculty who did this (grant lead, program coordinator, dean, etc.). Colleges could benefit from exposing faculty to opportunities to become more involved in those activities where faculty see a positive impact on student success.

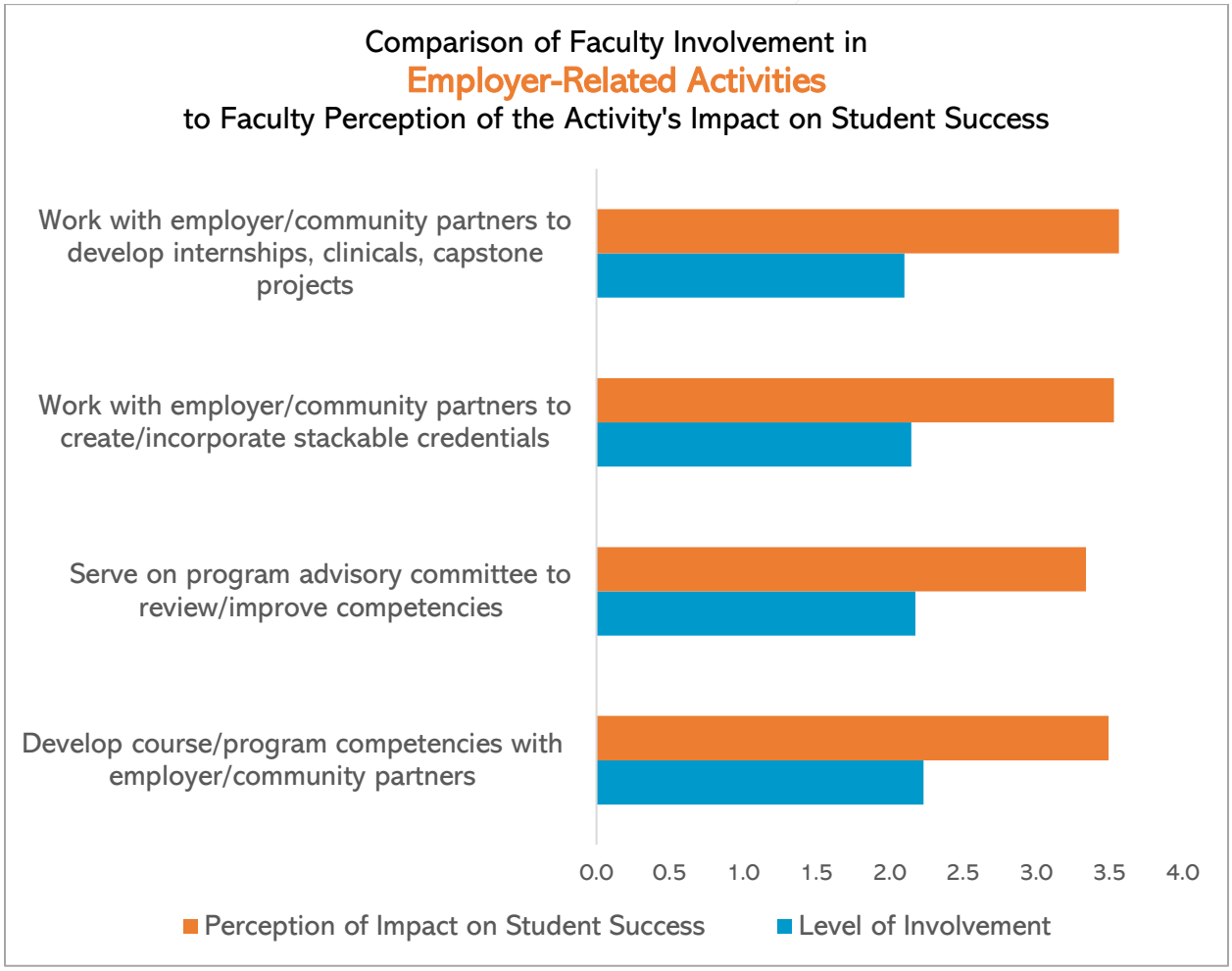


Figure 23: MoSTEMWINs Faculty Survey results related to employer engagement.

Figure 24 presents faculty involvement in curriculum-related activities compared to faculty perception of said activities' impact on student success. Faculty perceive connecting support services into classroom instruction as having the most impact upon student success. The activity with the most alignment between faculty involvement and perception of impact on student success is using non-traditional instructional modes. The greatest disparity between involvement and impact on student success occurred around redesign of developmental education courses.

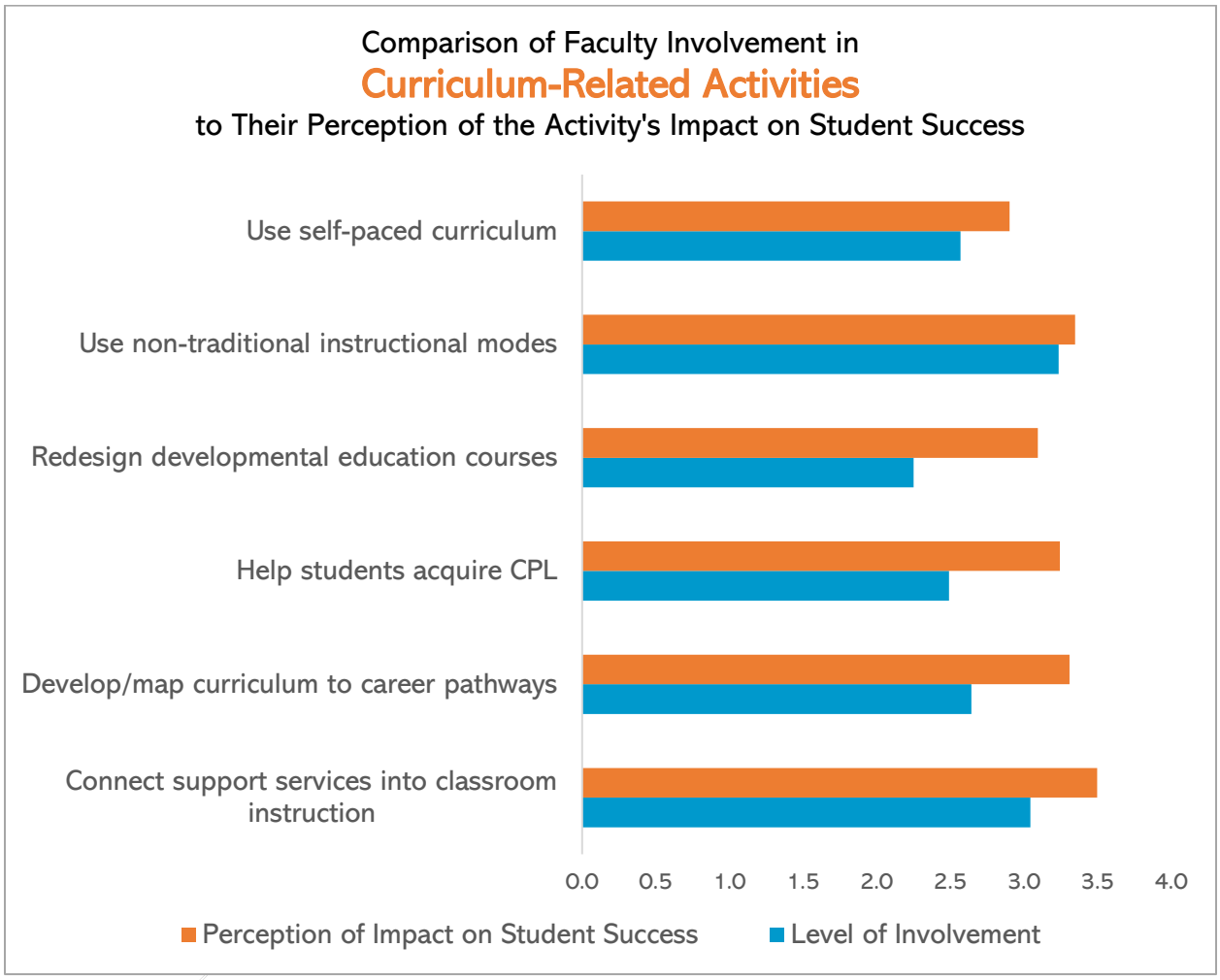


Figure 24: MoSTEMWINs Faculty Survey results related to curriculum.

Because faculty had indicated the importance of student support, we further explored what types of student support-related activities faculty had been involved in and what the impact of those activities were upon student success. Figure 25 examines faculty involvement in student support-related activities compared to faculty perception of said activities' impact on student success. Faculty perceive reaching out to ensure student progress as having the most impact upon student success and this activity also had the most alignment between faculty involvement and perception of impact on student success. The greatest disparity between involvement and impact on student success occurred around recruiting students and developing/assisting with instructional support services.

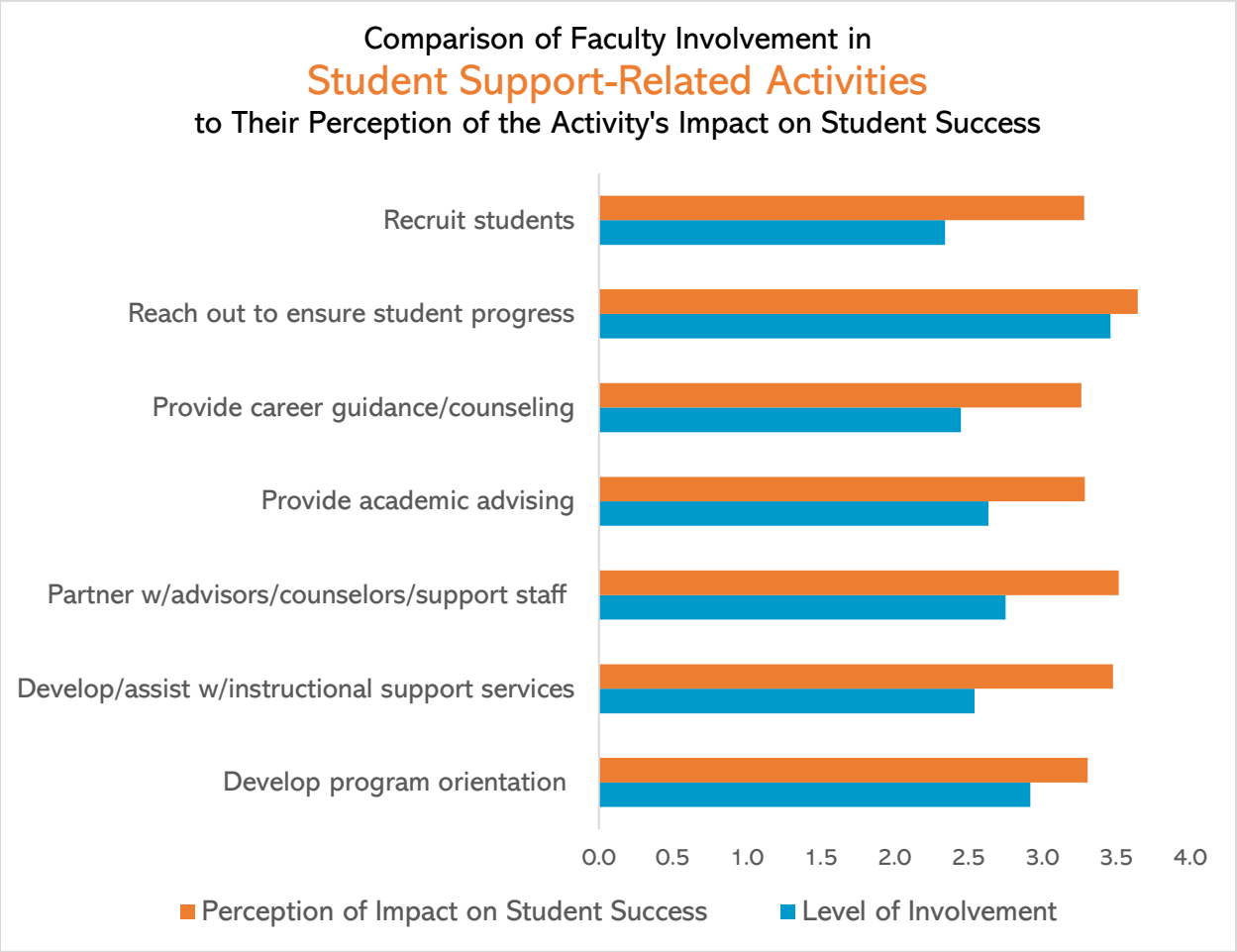


Figure 25: MoSTEMWINs Faculty Survey results related to student support.

Figure 26 presents faculty involvement in employment-related activities compared to faculty perception of these activities' impact on student success. Faculty perceive reaching out to employers to help completers secure employment as having the most impact upon student success and this is also the activity with the most disparity between faculty involvement and perception of impact. The activity with the most alignment between faculty involvement and perception of impact on student success is providing instruction at the employer's site.

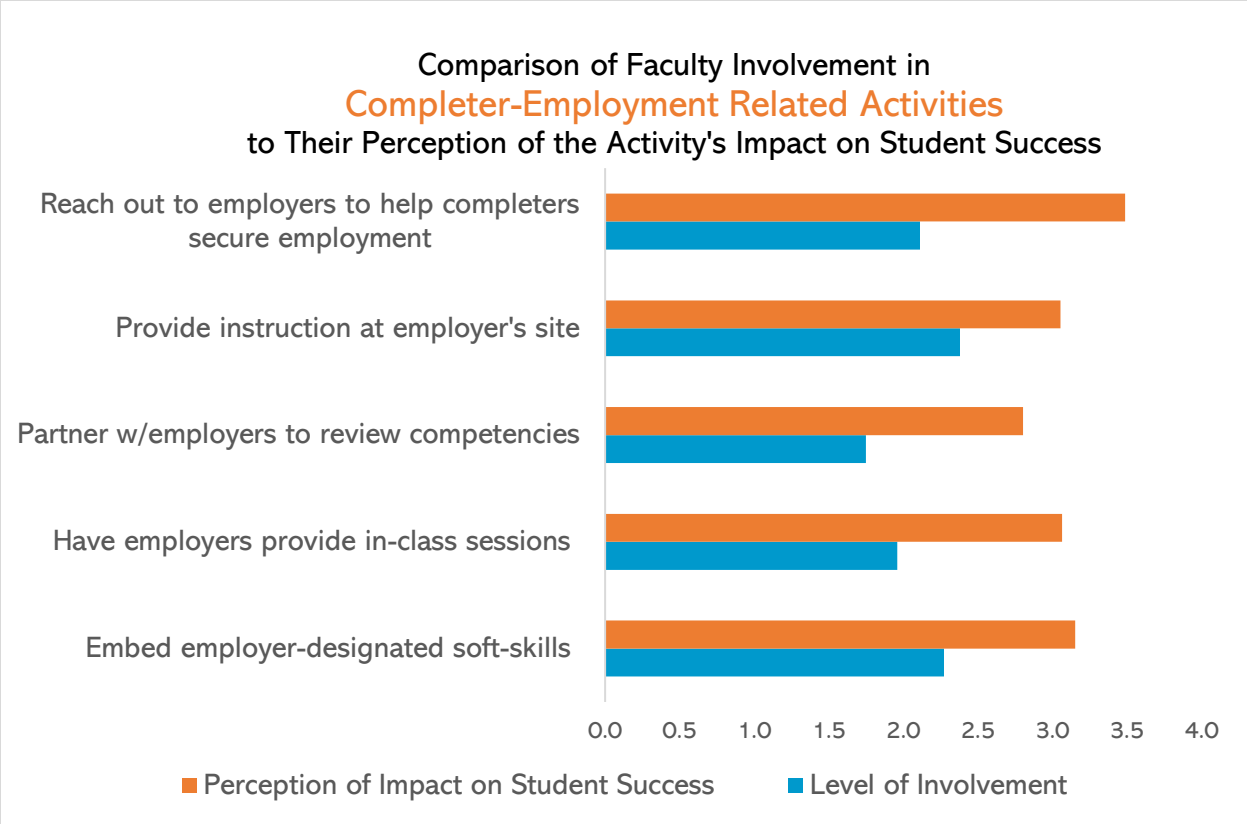


Figure 26: MoSTEMWINs Faculty Survey results related to completer employment.

In summary, our observations suggest faculty were both eager and pleased to engage with student support personnel through the use of instructional support teams. Faculty at several colleges were so pleased with such efforts that they indicated they were unlikely to return to previous instructional practices. Figure 27 presents selected comments regarding the MSW teaching experience.

Building instructional teams internally (faculty, leadership, coaches, student support staff) helped us all understand & respond to instructional & student needs. It might be a good idea to occasionally include employers in these conversations, so they better understand the challenges students & the college encounter in building the pipeline.

The teaching environment is simply the best I've participated in a nearly 20-year career. Colleague-wise, the collaboration is unparalleled. Not only is the curriculum self-paced for students, it is also under constant revision in response to faculty observation & expertise and, importantly, student participation & suggestions for improvement. Sadly, one challenge persists: "life happens" continues to work against student success. However, intrusive coaching & the ability of students to stop out & return where they left off is a significant address to that challenge.

Figure 27: Faculty comments regarding the MSW teaching experience.

EVALUATION QUESTION 4:

Did MoSTEMWINs programs serve the target population?

The consortium acquired and implemented Social Solutions' ETO as its data collection, management and reporting software system. MCCA staff provided staff development and guidance for college staff to assist with grant participant and outcome data collection. Member colleges used ETO to enter such data through a variety of methods. Some colleges continuously entered participant and outcome data directly into the statewide ETO database, while other colleges chose to "batch up-load" participant data files according to college timelines connected to their program start-up and program completion. All participant and outcome data examined in this section are based upon data provided by the consortium on July 9, 2018.

Participants enrolled in one or more of the grant-funded programs of study at MSW colleges. Table 5 presents the duplicated enrollment count in each program of study. The MSW Portal had the highest enrollment (477) and many of these students went onto enroll in another program of study. Additional programs with larger enrollments were truck driving (319), nursing (266), medical assistant (249), and computer concepts (242).

Table 5. Duplicated Enrollment by Program of Study

PROGRAM	DUPLICATED COUNT	PROGRAM	DUPLICATED COUNT	PROGRAM	DUPLICATED COUNT
Certificate of Specialization in Computer Programming	34	Certified Logistics Tech	75	Certified Nurse Assistant	11
Certificate of Specialization in IT Project Management	6	Certified Production Technician	250	Community Health Worker	85
CIS	109	Certified Production Technician	3	Dental Hygiene	30
Computer Concepts	242	Connector & Conductor	11	Diagnostic Medical Sonography	31
Electronics Technology Certificate	34	Green Production	56	Medical Assistant	249
Health Information Management|	15	Industrial Hydraulic Mechanic	6	Nursing	266
Information Technology Help Desk	26	Industrial Maintenance Tech	16	Nursing Assistant|	15
LaunchCode RebootU	25	Industrial Technology	111	Occupational Therapy Assistant|	20
Supplemental Instruction for MCC CSIS Credit Students	90	Mobile Hydraulic Mechanic	6	Patient Care Technician	106
Chemical Laboratory Technology	86	Multi-Skilled Tech/Certified Production Tech	73	Pharmacy Technician	72
Life Science Lab Assistant	13	Pneumatic Tech	3	Radiologic Technology	45
MoSTEMWINs Portal	477	Precision Machining Technology	26	Health Professionals Tutoring & Resource Lab	148
Transport Training	319	Welding - Level 1 Partial Basic	143		
UP Program	75	Welding - Level 2 Full Basic	68		

Populations Served by MoSTEMWINs

Data presented in this section include number of TAA-eligible participants; number of Veteran participants; the number of participants who were either unemployed or under-employed at initial grant enrollment; the number of first-time to college students; and the number of participants who lacked college-level academic skills at initial grant enrollment.

The MSW Consortium grant provided education and training programs to 2,935 unduplicated participants. The average age of MSW participants was 33. Figure 28 provides a breakdown of the total MSW enrollment by college.

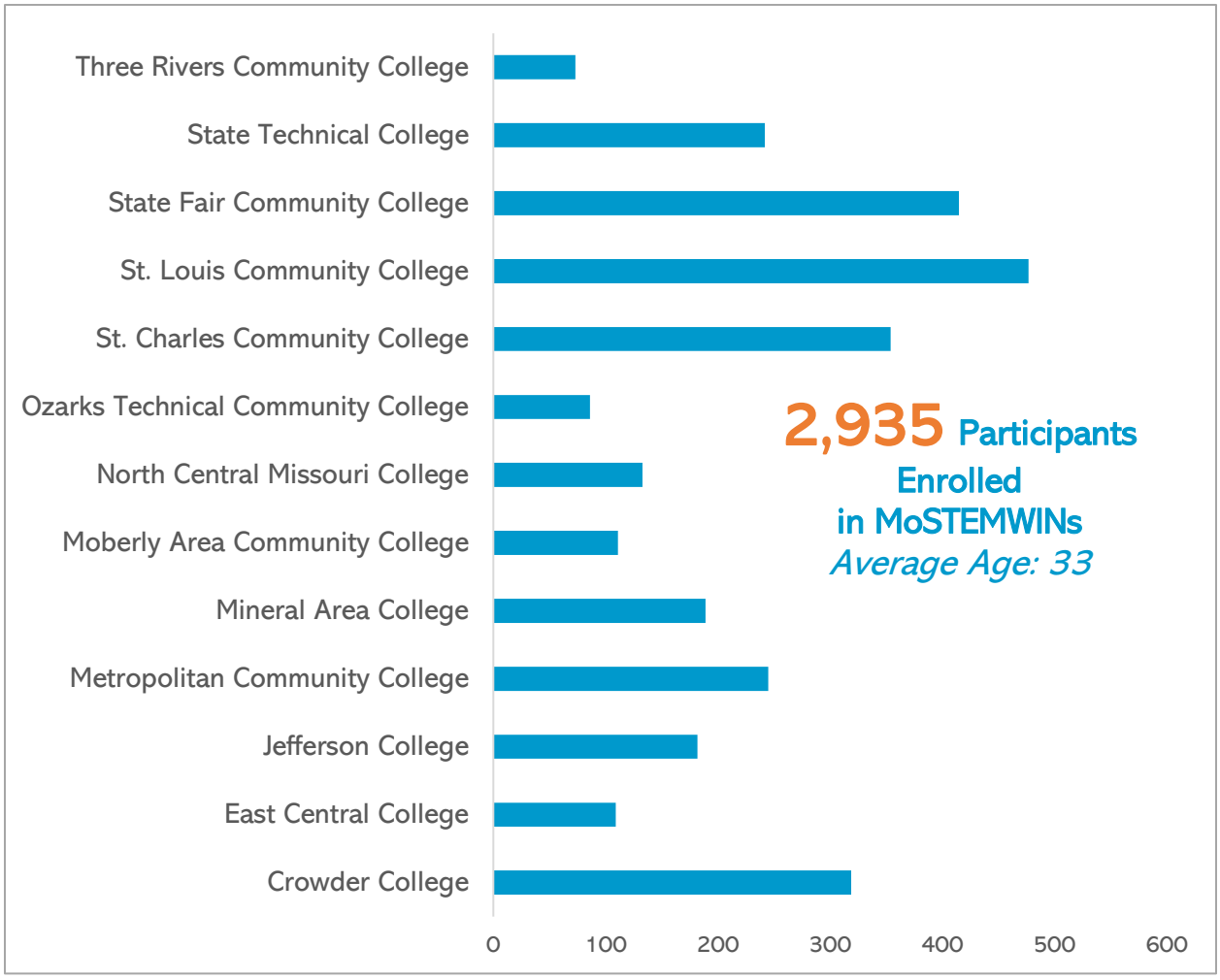


Figure 28: MoSTEMWINs enrollment by college.

Table 6 presents participant enrollment data for key populations outlined in the MSW statement of work.

Table 6. Participant Total & Percentage by Sub-group

Key Target Group	Participant Count	Percentage of Total Enrollment (n=2,935)
TAA eligible	67	2%
Veterans	193	7%
First-time enrolled in college	1,191	41%
Required remediation in math, reading or English upon initial program enrollment	1,759	60%
Not employed at initial program enrollment	1,354	46%
Under-employed at initial program enrollment	1,251	43%

Table 6 shows a sizeable number of under-served, targeted groups participated in the MSW consortium grant. Although the number of TAA-eligible enrollees is low, and the number of Veteran participants is less than 10 percent, nearly 90% of the participants were either not employed or under-employed when they began their grant program. Forty-one percent of the MSW grant participants were identified as first-time enrolled in college and 60% were not prepared for college-level work in at least one academic area (math, reading or English).

Evaluation Question 5:

Did MSW participants achieve desired student outcomes, how do actual grant outcomes compare to grant outcome targets?

This section of the report presents results on education and employment outcomes compared to the target outcomes presented in the original grant statement of work.

Education and Employment Outcomes

Of the total MSW participants (2,935), 65% (1,903) completed at least one grant-funded program of study. Of this total, some participants enrolled in and completed more than one program of study. The number of completers by program award are presented in Figure 29. Of the 2,935 unduplicated MSW participants, 65% (n=1,903) completed at least one industry-recognized, stackable credential.

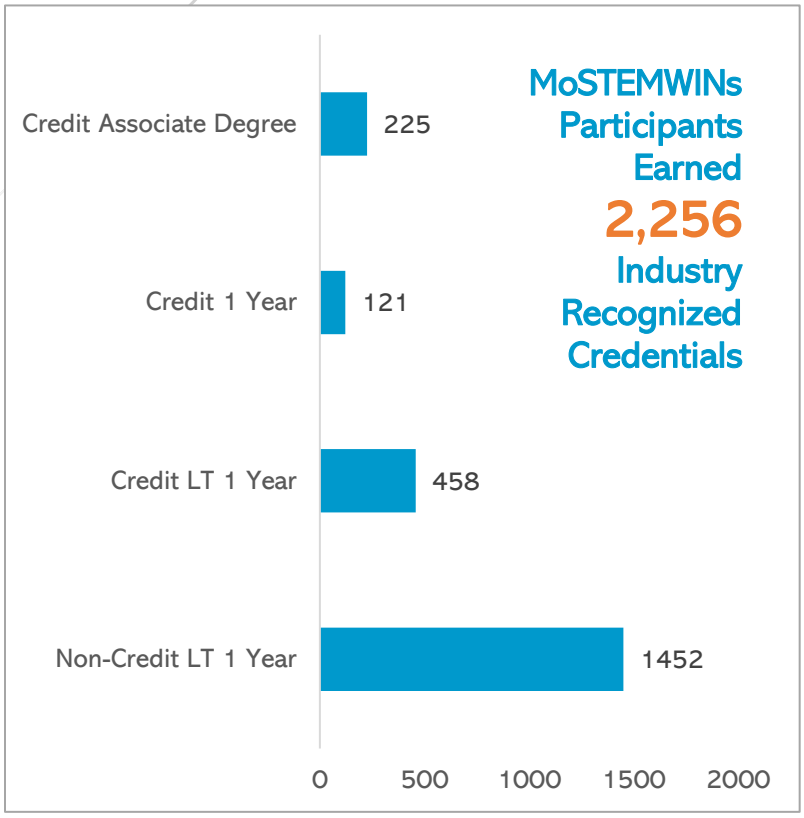


Figure 29: Duplicated number of awards by award level.

The MSW consortium worked with the Missouri Department of Economic Development (DED) as well as each college to collect pre and post grant employment and wage data for grant participants. Using a combination of official employment and wage data from DED, and individual college employment follow-up data, the consortium provided the TPE with post-grant unit record employment and wage data after grant exit. Table 7 provides program completion and post-completion employment data for participants by employment status at the start of the grant.

Table 7. MoSTEM Participants by Completion & Employment Status at Enrollment & Post-Grant

Initial Employment Status	Participant Count	Number & Percent Completed at Least One Program of Study	Number & Percent of Program Completers Employed Post-Grant
Not Employed at Enrollment	1,354	Count: 985 Completion Rate: 73%	Count: 569 Employment Rate: 58%
Employed at Enrollment	1,581	Count: 918 Completion Rate: 58%	Count: 572 Employment Rate: 62%
Total	**2,935**	Count: 1,903 Completion Rate: 65%	Count: 1,141 Employment Rate: 60%

Due to data tracking challenges and lagged time related to official DED UI and wage records, wage data are not available for all program completers employed post grant. Of the 569 non-incumbent workers who completed at least one program of study and were employed post grant, wage data are available for 396 of these individuals. Wage data provided by the consortium, show an estimated average annualized income for these 396 individuals as $28,000. Twenty-five percent of these participants show an annual wage of $13,000 or less, and 25% show an annual wage of $40,000 or more. As noted in the Limitations of Data, wage data can only be estimated due to the lack of complete and verifiable official wage records.

Of the 572 incumbent workers who completed at least one program of study and were employed post-grant, wage data provided by the consortium reveal an estimated average annual income of $27,000 for 344 of these individuals. Twenty-five percent of these participants show an annual wage of $14,000 or less and 25% show an annual wage of $36,000 or more.

The DOL required grantees to specify outcomes in their statement of work. To examine the extent to which the MSW consortium met these specified targets we compared actual grant performance to the designated targets. This analysis is presented in Figure 30. Given DOL's commitment to improving program completion and employment rates the following data points are especially relevant.

- Enrollment of 2,935 surpassed grant target of 1,853 by 58%.
- Grant Program of Study (POS) completers (1,903) surpassed the grant target (1,490) by 28%. The POS completion rate of 65% was less than the grant target program completion rate of 80%. (target of 1,490 completers divided by target of 1,853 participants).
- The grant employment target for non-incumbent workers who complete a program of study was 683. The actual number of non-incumbent workers who completed a program of study and were employed post grant is 569 (83% of the target).
- The grant employment target for all program completers was 739. The actual number of participants who completed a program of study and were employed is 1,141 thus surpassing the grant target by 54%.
- The target employment rate for all program completers was 50% (739 completers employed divided by 1,490 target of completers). The actual employment rate for program completers (60%) surpassed the target.

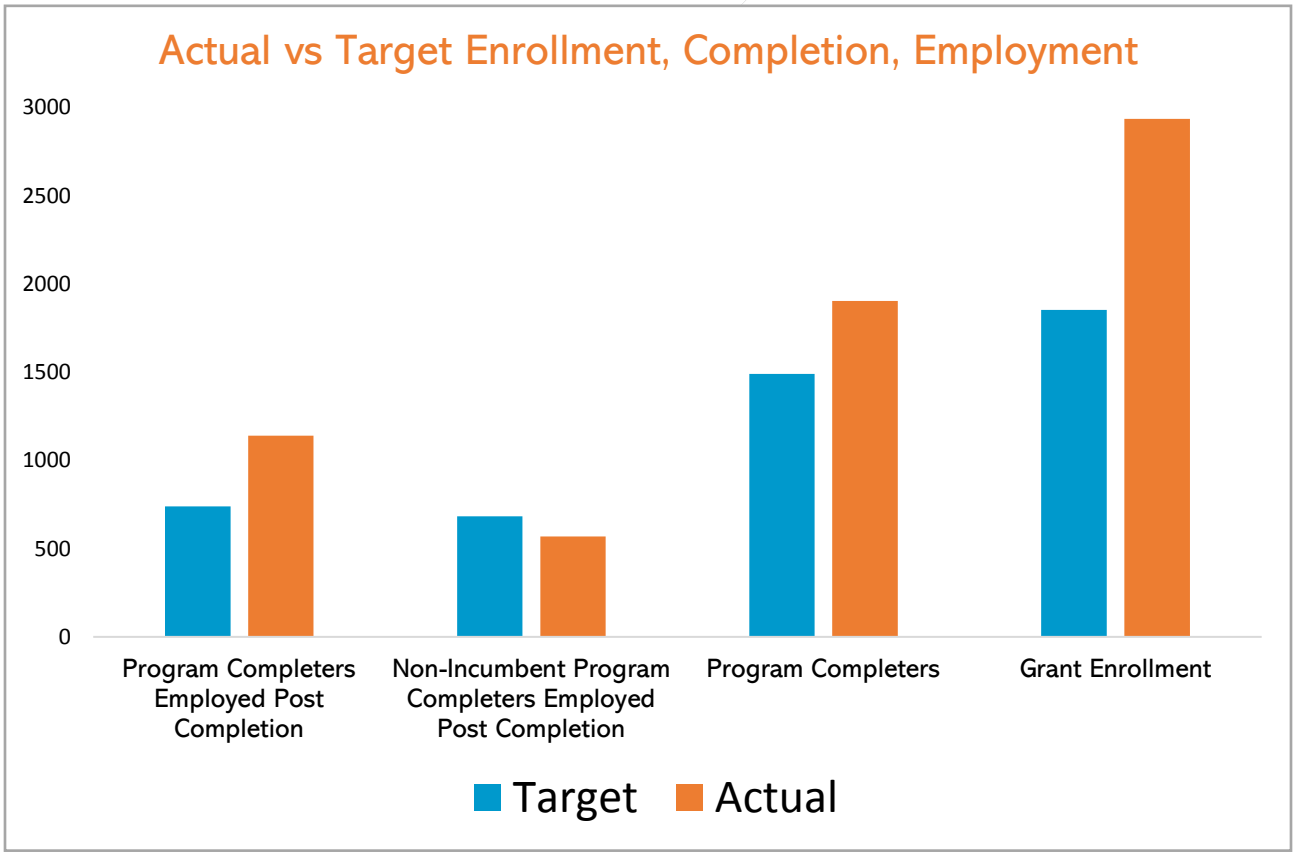


Figure 30: MoSTEMWINs targets vs actual outcomes.

Analysis of Outcomes for Key Populations

The previous sections of this report provided results on the consortium's performance on a number of grant-related education and employment outcomes. This section directs attention to the evaluation question: *Did MSW participants in key subgroups achieve desired student outcomes.*

The MSW colleges were encouraged to develop programs and strategies to meet both state and local needs, and this often-required customizing programs for key populations. Because the MSW colleges offered a variety of programs and served diverse sub-groups of participants, it is worthwhile to look more deeply into program completion and employment outcomes by key population groups.

Program Completion and Employment by Partner College

Table 8 presents enrollment, completion, and employment results for each MSW college, displaying a range of results by college on the selected outcomes measures.

Across the consortium, program completion rates varied from 21% at Moberly Area College to 100% at Crowder College. Program completion rates at Crowder College, Metropolitan Community College, North Central Missouri College, St. Charles Community College, St. Louis Community College, State Fair Community College, State Technical College, and Three Rivers College all surpassed 50%.

Employment rates for program completers varied from a high of 87% at Crowder College to a low of 5% at Ozarks Technical Community College. Crowder College, East Central College, Jefferson College, Mineral Area College, Moberly Area Community College, St. Charles Community College, and St. Louis Community College all achieved employment rates for program completers of 60% or more.

Table 8. Enrollment, Completion, & Employment by College

Performance Outcome	CC	ECC	JC	MCC	MAC	MACC	NCMC	OTC	SCC	STLCC	SFCC	STCM	TRC
Unduplicated Participants	319	109	182	245	189	111	133	86	354	477	415	242	73
Program Completers	319	53	73	142	78	23	86	21	219	375	233	216	65
Program Completion Rate	100%	49%	40%	58%	41%	21%	65%	24%	62%	79%	56%	89%	89%
Completers Employed includes all Completers	277	39	44	42	70	16	32	1	135	244	136	82	25
Completer Employment Rate	87%	74%	60%	30%	90%	70%	37%	5%	62%	65%	58%	38%	38%

Participant Completion and Employment Status by Demographic Categories

A primary purpose of the MSW grant was to provide instructional programs and support services designed to boost program completion and employment attainment, for first-time to college adults and other under-served populations. We examined these outcomes for a number of subgroups. Tables 9-12 provide program completion and employment follow-up data for these subgroups.

Table 9. Participant Completion & Employment by Gender

GENDER	Total	Completer		Completer and Employed	
Attribute	Count	Count	Percent	Count	Percent*
Male	1429	931	65%	539	58%
Female	1493	963	64%	599	62%

* percent calculated using # of completers employed
NB the total is only 2,922 due to 13 missing gender codes

It is worth noting the consortium colleges were able to attract a large number of women to their STEM related programs. Males and females completed their programs of study at nearly the same rate, and completion rates were high for both males and females (65%, and 64% respectively). In addition, employment rates for both male and female program completers were high and nearly the same (58%, and 62%, respectively).

Table 10. Participant Completion & Employment by Ethnicity

ETHNICITY	Total	Completer		Completer and Employed	
Attribute	Count	Count	Percent	Count	Percent*
Black, Non-Hispanic	590	406	69%	230	57%
Other Minority	394	285	72%	193	68%
White	1951	1212	62%	718	59%

*Percent is of program completers.

Although program of study completion rates are high for all ethnic groups, Table 10 shows MSW participants who reported themselves as Other Minority or as Black, Non-Hispanic were more likely to complete their program of study (72% and 69% respectively). While the program completion for White, Non-Hispanic participants of 62% was slightly less than the program completion for all participants (65%). Across all ethnicities, there was variation in employment rates for program completers, with Other Minority participants showing the highest employment at 68%. Employment rates for program completers who were Black, Non-Hispanic and White, Non-Hispanic were nearly the same (57% and 59% respectively).

Table 11. Participant Completion & Employment by Age Group

AGE CATEGORY	Total	Completer		Completer and Employed	
Attribute	Count	Count	Percent	Count	Percent*
Less than 21	411	205	50%	103	50%
21-25	619	399	64%	244	61%
26-30	472	306	65%	182	59%
31-40	656	449	68%	264	59%
41-50	442	308	70%	194	63%
Over 50	335	236	70%	154	65%

*Percent is of program completers.

Table 11 above shows younger participants were the least likely to complete their MSW program of study. The program completion rate for the less than 21 age group was 50%. However, starting with the 21-25 age group, program completion rates increase as participant age increases. The program completion rates for the 21-25, 26-30, and 31-40 age groups were 64%, 65%, and 68% respectively, while the completion rates for the 41-50 and over 50 groups were 70%. Employment rates for program completers by age category followed a similar patter with the less than 21 group having the lowest employment rate (50%) and the over 50 age group showing the highest employment rate (65%).

Table 12. Participant Completion & Employment by Academic Skill Level at Initial Enrollment

ACADEMIC SKILL LEVEL	Total	Completer		Completer and Employed	
Attribute	Count	Count	Percent	Count	Percent*
College Ready All Areas	664	432	65%	290	67%
Less than College Ready in at Least One Area (Math, Reading, or English**)	1759	1228	72%	744	60%

*Percent is of the program completers.
** No data were reported for 512 participants.

Table 12 depicts the completion and employment rates for MSW participants by academic skill levels and divides MSW participants into two categories: those who were college-ready in all

areas and those who needed developmental education in at least one area of math, reading, or English. MSW participants who began as college ready in all academic areas were slightly less likely to complete their program (65%) than those MSW participants who started as non-college ready in at least one academic area (72%). This difference is likely related to program structure and content, as those who started as non-college ready were more likely to enroll in shorter, less complex, and less comprehensive programs of study.

Employment rates upon program completion were higher for participants who began as college ready (67%), than participants who began as less than college ready in at least one academic area (60%).

Participant Completion and Employment Status For Adult, High-Need Groups

Given the MSW goal of increasing access for unemployed and academically low-skilled adult populations, further analysis related to this key target group was conducted. Although Missouri's economic picture and related unemployment rate has improved since MSW began in 2014-2015[13], data from the Bureau of Labor Statistics (2017) reveal the following data related to unemployment rates by educational attainment.

- adults with less than a high school degree, 6.5%
- adults with a high school degree, 4.8%
- adults with an Associate Degree, 3.4%

In addition, adults with an Associate Degree are estimated to make 24% more a year than adults with only a high school diploma.[14] Bureau of Labor Statistics: https://www.bls.gov/emp/ep_chart_001.htm)

Onboarding data collected by the colleges show two primary groups of adult, high-need populations who had not achieved a post-secondary credential/degree AND were either under-employed or un-employed at initial grant enrollment. These groups are defined below.

- High-Need *Young* Adults aged 21-25 with no post-secondary credential/degree AND under-employed or unemployed at program start-up.
- High-Need Adult population aged 26 and older with no post-secondary credential/degree AND under-employed or unemployed at program start-up.

[13] Missouri unemployment rate in August 2014 was 6.3% and December 2017 Missouri unemployment rate stood at 3.5% http://apps.labor.mo.gov/data/statArchives.asp

[14] Bureau of Labor Statistics: https://www.bls.gov/emp/ep_chart_001.htm

Given employers current demand for a skilled workforce, plus the added economic value of a post-secondary credential/degree, these high-need adults are likely to face continued challenges in securing meaningful employment.

Table 13 presents program completion and employment follow-up data for these high-need adult populations compared to the overall program completion and employment data for all grant participants.

Table 13. Program Completion & Employment for Adult High-Need Subgroups

Adult Group	Program Completion	Employment for Program Completers
Adult High-need **Age: 21-25** 517 Participants	Count: 341 Completion Rate: 66%	Count: 212 Employment Rate: 62%
Adult High-need **Age: Over 25** 1,303 Participants	Count: 898 Completion Rate: 69%	Count: 529 Employment Rate: 59%
1,903 2,935 Participants	Count: 1,903 Completion Rate: 65%	Count: 1,141 Employment Rate: 60%

Table 13 reveals the program completion rate for both high-need adult groups was higher than the overall program completion rate for all grant students. In addition, the employment rate for program completers in the High-need Adult 21-25 group was higher than the employment rate for all grant program completers. The employment rate for program completers in the High-need Adult Over 25 group was nearly the same as the overall employment rate for program completers.

POSSIBLE IMPACT OF INTRUSIVE ADVISING PRACTICES ON PROGRAM COMPLETION

All 13 MSW partner colleges implemented some form of intrusive student advising/support for students enrolled in a grant-funded program of study. This key strategy was designed to support students at the start, during and at the conclusion of their program of study. As outlined above, intrusive advising/support took a number of different forms. To more fully explore the potential impact of these intrusive advising practices on program completion, we examined the frequency and scope of the various practices and compared those results to program completion outcomes.

To help capture the extent to which grant students received various types of support, colleges were asked to gather data related to the number of times a student engaged in each of the categories listed in Table 14. The categories in Table 14 are sorted according to the total number of contacts.

Table 14. Intrusive Advising/Support Categories Sorted by Total Contacts

Intrusive Advising/Support Category	Total Number of Contacts
Core Advising Appointment for Program Planning	4,650
Career Counseling/Planning	4,113
Academic Skill Development	2,944
Financial Aid Assistance	373
Academic Early Alert Notifications/Assistance	224
Academic Recovery	77
Transfer Advising/Assistance	26
Personal Financial Concerns	23
Personal Counseling Referral	22
Academic Probation	21
Financial Aid Suspension	1

Eleven colleges provided data related to the number of contacts students had with advisors associated with each of the categories in Table 14. Although Crowder College and St. Louis Community College did provide intrusive advising/support/navigation to grant students and did collect data associated with this strategy, questions/issues with the consortium's ETO data uploading system prevented these college from including these data in their student unit-record files.

Table 14 reveals Core Advising Appointment for Program Planning, Career Counseling/Planning, Academic Skill Development, Financial Aid Assistance and Academic Early Alert Notification/Assistance were used the most often. To explore the extent to which the use of such services may have aided in program of study completion, we conducted a Pearson Correlation analysis using these categories and the program of study completion variable. For purposes of this analysis program completion was operationalized as a dichotomous variable with 0 = No Program Completion and 1 = Completed at Least One Program. Results from this analysis are presented in Table 15.

Table 15. Pearson Correlation Values Between Selected Intrusive Advising Contacts & Program Completion

Intrusive Advising/Support Category	Pearson r-value with Program Completion	Significance Level
Core Advising Appointment for Program Planning	-.026	Not Significant
Career Counseling/Planning	+.16	$p < .01$
Academic Skill Development	+.18	$p < .01$
Financial Aid Assistance	+.030	Not Significant
Academic Early Alert/Notification Assistance	-.10	$p < .01$

Table 15 reveals the number of contacts related to Career Counseling and the number of contacts related to Academic Skill Development have a weak, positive correlation with program completion. Pearson correlation r-values for both variables are significant at the $p < .01$ level. These findings support the theory that students who used such services on a regular basis may have been more likely to complete a program of study.

Table 15 also reveals the number of contacts related to Academic Early Alert/Notification Assistance has a weak, negative correlation with program completion. Pearson correlation r-value for this variable is significant at the $p < .01$ level. This result seems to suggest that students who needed to use this service on a regular basis were less likely to complete their program of study.

EVALUATION QUESTION 6:

How do grant program completion and employment results compare for grant participants to non-grant students?

Up to this point we have presented an extensive set of outcomes for MSW participants, plus an in-depth analysis of differences in completion and employment rates for various MSW sub-groups. In this section we will explore the extent to which the MSW grant impacted program completion and employment upon program completion. This impact analysis is designed to help answer the question: how would program completion and employment outcomes look if students had not enrolled in a grant program?

To assist in determining the extent to which MSW participants differed in terms of program completion AND employment at program completion from non-grant students, we built a Non-grant Control Group. The Non-grant Control Group consisted of 908, credit-seeking, first-time to college students who enrolled in a STEM related program with a Missouri community college in the Fall 2013 academic term. We tracked academic and employment outcomes for this Non-grant Control Group through December 2016.

We then combined this Non-grant Control Group with 551 MSW credit-seeking students[15] (MSW Treatment Group) who were first time to college in the Fall 2014 academic term. We tracked academic and employment outcomes for the grant students through December 2017. We then employed logistic regression analysis on the full data set of 1,459 records to examine the impact of MSW grant participation on program completion and employment.

[15] Programs offered to the MSW Participants and Non-grant Control Group differed regarding program mix, as the MSW participants had greater access to non-credit, short-term programs. To ensure appropriate comparability among the MSW Participants and the Non-grant Control group, we restricted the regression analysis to students from both the MSW Participant group and the Non-grant Control Group who were first time to college and enrolled in programs which led to a "credit" program award.

Table 16. Comparison Between the Non-grant Control Group & the MoSTEMWINs Treatment Group for Key Background Variables

Background Variable	Non-grant Control Group	MSW Treatment Group
Average Age	27	30
Percentage 25 & Younger	48%	47%
Percentage Over 25	52%	53%
Percentage Female	37%	43%
Percentage Male	63%	57%
Percentage Incumbent Workers	54%	49%
Percentage Non-Incumbent Workers	46%	51%
Percentage Minority	12%	27%
Percentage White	88%	73%
Percentage with Dev Ed Need	48%	77%
Percentage College Ready All Areas	52%	23%

Table 16 reveals the Non-grant sample and MSW Treatment sample were comparable with regard to age, gender, and entering employment status. In regard to race, the MSW Treatment sample was more likely to classified as Minority and with regard to entering academic skills, more likely to require remediation in one or more academic areas.

Impact: Logistic Regression Model 1:
MSW Grant & Non-Grant Student Program Completion

Model 1 examines program completion as the outcome variable and includes the following set of dichotomous control variables.

- Gender: (0=Male and 1=Female)
- Age Group: (0=25 & Younger and 1=Greater than 25)
- Race: (0=Minority and 1=White)
- Dev Ed Need: (0=College ready all areas and 1=Non-college ready in at least one academic area)
- Student employed at program start (0=Not employed and 1=Employed)

The treatment variable in this analysis is MSW Participant or Not (0=Non-grant student and 1=MSW Participant). Key results are associated with Regression Model 1 are presented below.

Table 17. Regression Analysis Results for Variables Predicting Program Completion (n=1,459)

Total Treatment & Control Group, Credit Programs Only	Omnibus Tests of Model Coefficients & Sig. Level	Nagelkerke R-Squared
N = 1,459	**Chi-Square (6) = 356.29 Sig. <.001**	**0.300**

Table 18. Classification Table

Observed			Predicted		
			Completer Code		Percentage Correct
			No	Yes	
Step 1	Completer Code	No	845	123	87.3
		Yes	242	249	50.7
	Overall Percentage				**75.0**
The cut value is .500					

Table 19. Variables in the Equation

	B	S.E.	Wald	df	Sig.	Exp(*B*)
MSW Participant or Not	1.768	0.136	169.395	1	.000	5.859
Adult Group (25 or younger & over 25)	0.940	0.130	52.128	1	.000	2.559
Employed at Program Start	-0.725	0.129	31.635	1	.000	0.484
Race	-0.447	0.174	6.611	1	.010	0.640
College Ready at Program Start	-0.324	0.136	5.5669	1	.017	0.723
Gender	-0.174	0.133	1.709	1	.191	0.840
Constant	-0.599	0.364	2.714	1	.099	0.549

The model's Omnibus Test of Model Coefficients Chi-Square value of 356.29 (sig. <.001) reveals the model performs well as a set of variables and is statistically significant. This finding suggests the model explains a significant portion of the observed variance in the program completion outcome variable, and the model's predictive power improves as we add explanatory variables.

The Nagelkerke R-Squared value of 0.300 reveals the model explains approximately 30% of the variance in the program completion outcome variable. The Classification Table 18 shows the model correctly classified 75% of the cases. A further review of the results indicates MSW Grant Participants were six times more likely to complete their program of study than Non-grant students (Exp(*B*) = 5.850). MSW grant participants over 25 were two times more likely to complete their program of study (Exp(B) = 2.559), than other groups of students.

Although Employment Status at Program Start, Race, and College-Academic-Readiness show statistically significant contributions to the model ($p < .05$), the amount of explained variable is small for each of these variables (less than 1%). This further supports the finding that MSW grant participation and classification in the over 25 age group appear to explain the majority of the model's predictive power.

Impact: Logistic Regression Model 2:
MSW Grant & Non-Grant Student Employment upon Program Completion

Certainly, program completion is an important outcome, but MSW was also designed to increase the employability of its participants. Model 2 examines Employment upon Program Completion as the outcome variable for both the MSW Grant Participants and Non-grant students and includes the following set of dichotomous control variables.

- Gender: (0=Male and 1=Female)
- Age Group: (0=25 & Younger and 1=Greater than 25)
- Race: (0=Minority and 1=White)
- Dev Ed Need: (0=College ready all areas and 1=Non-college ready in at least one academic area)
- Student employed at program start (0=Not employed and 1=Employed)

The treatment variable in this analysis is MSW Participant or Not (0=Non-grant student and 1=MSW Participant).

Again, it is important to note that programs offered to the MSW Participants and Non-grant Control Group differed regarding program mix, as the MSW Participants had greater access to non-credit, short-term programs. To ensure appropriate comparability among the MSW Participants and the Non-grant Control group, we restricted the regression analysis to students from both the MSW Participant group and the Non-grant Control Group who were first time to college and enrolled in programs which led to a "credit" program award.

The following key results are associated with Regression Model 2.

Table 20. Regression Analysis Results for Variables Predicting Employment Upon Program Completion (n=1,459)

Total Treatment & Control Group, Credit Programs Only	Omnibus Tests of Model Coefficients & Sig. Level	Nagelkerke R-Squared
N = 1,459	**467.817 (6), Sig. <.001**	**0.448**

Table 21. Classification Table

Observed			Predicted		
			Employed at Program Completion		Percentage Correct
			No	Yes	
Step 1	Employed at Program Completion	No	1,135	59	95.1
		Yes	116	149	56.2
	Overall Percentage				**88.0**
The cut value is .500					

Table 22. Variables in the Equation

	B	S.E.	Wald	df	Sig.	Exp(*B*)
MSW Participant or Not	2.897	0.213	184.987	1	.000	18.127
Adult Group (25 or younger & over 25)	1.181	0.176	44.810	1	.000	3.258
Employed at Program Start	-0.972	0.171	32.003	1	.000	0.378
Race	-0.552	0.204	7.341	1	.007	0.576
College Ready at Program Start	-0.180	0.194	0.858	1	.354	0.836
Gender	-0.509	0.180	8.031	1	.005	0.601
Constant	-2.244	0.450	24.831	1	.000	0.106

The model's Omnibus Test of Model Coefficients Chi-Square value of 467.817 (sig. <.001) reveals the model performs well as a set of variables and is statistically significant. This finding suggests the model explains a significant portion of the observed variance in the employment upon program completion outcome variable, and the model's predictive power improves as we add explanatory variables.

The Nagelkerke R-Squared value of 0.448 reveals the model explains approximately 45% of the variance in the employed upon program completion outcome variable. The Classification Table 21 shows the model correctly classified 88% of the cases. A further review of the results indicates MSW Grant Participants were 18 times more likely to complete their program of study and be employed upon program completion than Non-grant students (Exp(*B*) = 18.127). MSW grant participants over 25 years of age were three times more likely to complete their program of study and secure employment upon program completion (Exp(B) = 3.258) than other groups of students.

Although Employment Status at Program Start, Race, and Gender show statistically significant contributions to the model ($p < .05$), the amount of explained variation is small for each of these variables (less than 1%). This further supports the finding that MSW grant participation and classification in the over 25 age group appear to explain the majority of the model's predictive power.

Regression models 1 and 2 suggest participation in the MSW grant had a positive impact on credit program completion and employment upon program completion for first-time to college students. A portion of this impact may be attributed to the accelerated and condensed time period of MSW programs compared to the traditional programs available to the Non-grant Control students. It is important to keep in mind that changing program structures to include shorter-term, industry recognized credentials was a key ingredient in the grant's attempt to accelerate students through a program and into employment.

Moreover, adult students over 25 years of age appear more likely to complete their program of study and secure employment upon program completion. Further subgroup analysis related to program completion and employment upon program completion for MSW participants and non-grant participants over the age of 25 is presented in Table 23.

Table 23. Subgroup Program Completion & Post Completion Employment by Age Group & MSW Participation for Grant Treatment Sample & Non-grant Sample (Credit Program Only)

Grant Treatment Sample or Non-grant Sample	Program Completion Rate	Percentage of Program Completers Employed After Completion
Grant Treatment Sample 25 or Younger (n= 261)	46%	58%
Grant Treatment Sample Over 25 (n = 290)	70%	80%
Non-grant Sample 25 or Younger (n = 439)	11%	8%
Non-grant Sample Over 25 (n = 469)	25%	26%

Table 23 reveals that regardless of MSW grant participation, adult students over 25 years of age were more likely to complete a program of study and were also more likely to secure employment upon program completion than students under 25 years of age. When controlling

for MSW grant participation, this result is more impressive, as 70% of the MSW grant treatment sample over 25 years of age completed a program of study and 80% of the program completers were employed post-program completion.

EVALUATION QUESTION 7:

What innovations/strategies appear to hold promise for future scaling and sustainability?

In 2012 Missouri received its first TAACCCT funding and the state's community colleges joined together to form the MoWINs consortium. This experience of working together has led to increased collaboration and the sharing of lessons learned associated with innovative concepts such as stackable and latticed program credentials, intrusive student support services, improved employer engagement, and workforce development strategies targeted to specific industries and employer needs. The collective impact of increased collaboration continues to grow and is best captured by the words of one long-time college leader, "the Consortium worked". This view was first expressed at the end of Round 2 and by the mid-point of Round 4, college faculty, staff and leadership across the state share this refrain. TPE data analysis, as well as campus and statewide observations suggest that as MoSTEMWINs concludes, the innovations/strategies outlined in Figure 31 appear to hold promise for future scaling and sustainability.

As colleges and statewide education and workforce development agencies continue to explore promising innovations, it is important to note Missouri's colleges have benefited from grant resources and experiences related to previous TAACCCT grants (statewide Rounds 1 and 2 as well as three individual and one national consortium TAACCCT awards) and have demonstrated the capacity to continue to evaluate and scale innovations from these previous grants.

- Development of career pathways using industry recognized stackable credentials and degrees/awards.
- Continuous employer engagement using a ladder approach that stresses employer engagement from program design/creation through instructional support and onto program completion and employment for students.
- Intrusive and intentional student support services which are directly connected to programs and faculty. Efforts to provide such services along a continuum from initial recruitment/enrollment and thru program completion and onto employment appear to be especially promising.
- Accelerated and contextualized efforts to reform developmental education efforts.
- Continued use and expansion of Credit for Prior Learning systems and practices.

Figure 31: Strategies holding promise for sustaining and/or scaling.

These innovations/strategies are not magic bullets. Their design, implementation, and support require colleges to change institutional practices/systems and undertake a number of new approaches and activities. Without specific attention to sustaining and scaling, institutional support is likely to wane. Figure 32 reveals the activities colleges reported the most often in regard to scaling and future sustainability.

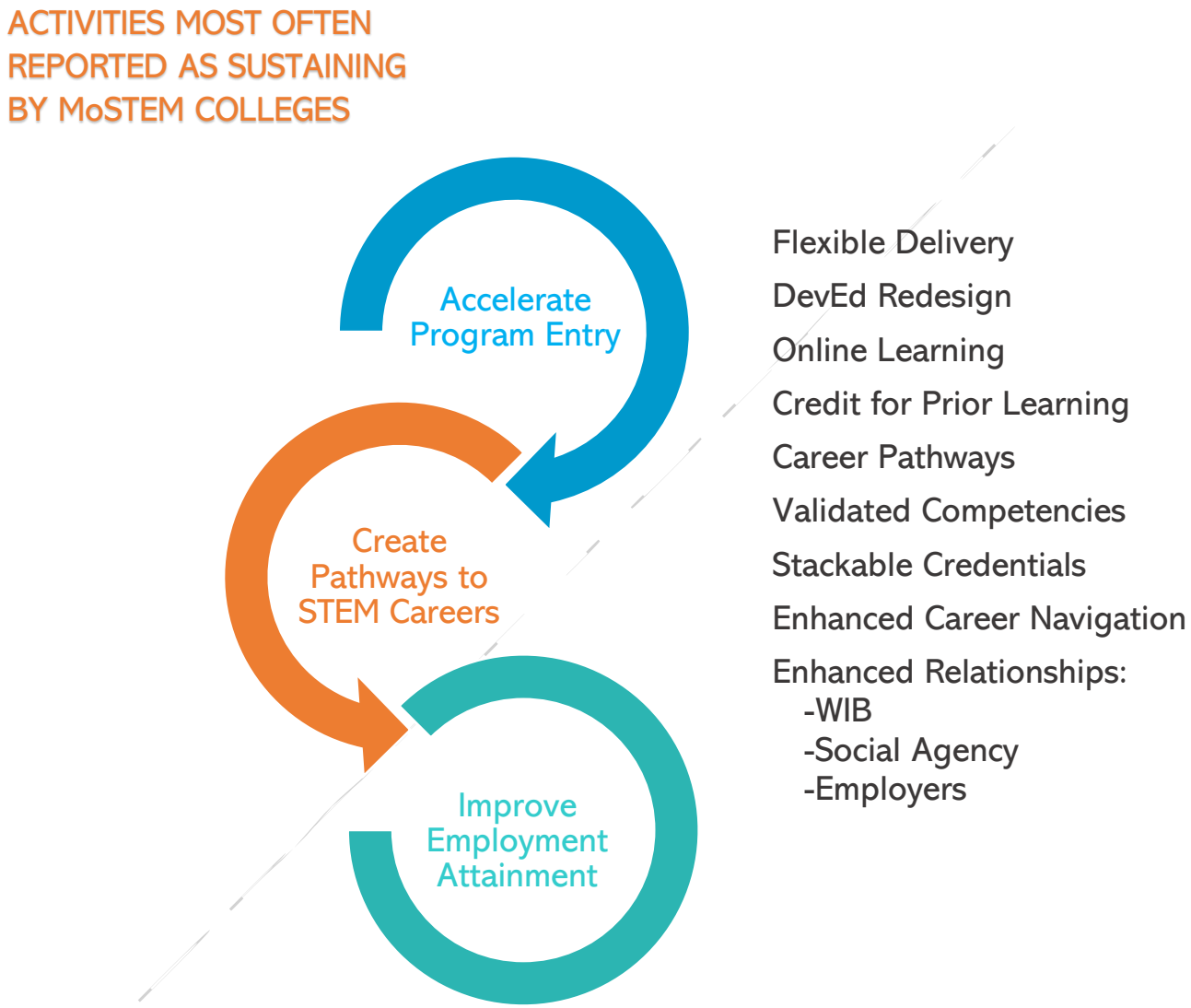
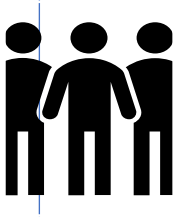


Figure 32: Activities most commonly reported as sustaining by MoSTEMWINs colleges.

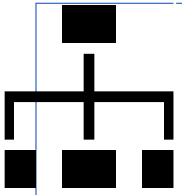
Based upon TPE analysis of the collective body of MoWINs work, we see six areas where MSW colleges have demonstrated the ability to learn from their MSW experiences. These areas are: program design, serving adult-learners, connecting innovations to overall college processes, employer engagement, using data, and connecting local workforce and student needs. Figure 33 summarizes these findings.

Progress & Potential

Improving pathways, incorporating stackable credentials, embedding industry-recognized certifications within program, offering non-traditional scheduling, connecting short-term, non-credit programs to credit bearing programs, the use of credit for prior learning.

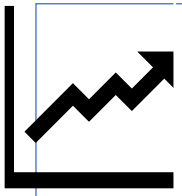


Understanding barriers for under-served population; recognizing accelerated programs for such students require increased advising/support services; expanding advisor's role to help students navigate multiple college processes.

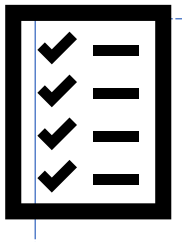


Maintaining momentum & organizational support for new concepts/shifts in organizational culture; enhancing executive leadership support for & connection to innovation, experimentation & expansion of CTE through workforce development partnerships.

Expanding MoWINs lessons learned regarding employer engagement beyond PAC: assessing LMI & local need and finding credential to meet those needs; educating employers about credentials & LMI; training students on current procedures & equipment.



Systematically connecting: grant strategies to continuous improvement efforts; grant program & existing programs to planning efforts; college to innovative undertakings to learn from the experiments. Collecting, analyzing, & using data to improve student success.



Demonstrating to students the value of the instruction right away (contextualization, hands-on labs, instructors with industry experience, employers in classroom); clearly articulating to students career pathway & stackable credentials & their value.

Figure 33: Progress & potential: Learning demonstrated by MoSTEMWINs colleges.

Given the complex nature of developing innovative instructional programs and student support strategies across 13 decentralized colleges, the MoSTEMWINs consortium anticipated that colleges would likely encounter challenges and be required to adapt programs and strategies along their MoSTEMWINs journey. To track and explore such information in a systematic manner and support both college and consortium-wide use of data for continuous improvement, C&A collected information related to accomplishments, challenges, and lessons learned through a series of self-assessment tools (baseline, midpoint and final self-assessments).

Colleges completed their final self-assessment tool and such data were confirmed and discussed during final campus and consortium management site visits and interviews. Data were collected through interviews with campus grant leadership, campus presidents & leadership faculty, students, program advisors/navigators, and employer/community partners. Despite positive student outcomes connected to such innovations, colleges recognized the need to address specific challenges and barriers as they continue to develop and expand new approaches related to career and technical education and programming and services for adult target markets. Table 24 presents a set of common challenges expressed by the partner colleges.

Table 24. Common Challenges Faced by Partner Colleges

Major Challenges Reported by MoSTEMWINs Colleges
Innovative programming that does not conform to the term-based standard and course schedule and allows for open entry and flexible program completion can challenge existing college processes, practices, and information/data systems. Existing "organizational silos" can amplify this challenge.
Even when grant innovations have demonstrated increases in student engagement and increases in student academic and employment outcomes, connecting such innovations/strategies to mainstream college practices/processes is challenging.
Once grant funds are no longer available, strategies for appropriate resource acquisition and/or reallocation must be developed. The likelihood of increased revenue from traditional sources related to state aid and tuition are limited.
Intrusive student support services and student success teams consisting of advisors, navigators, and program faculty add costs to institutional budgets and may be difficult to sustain when grant funding ceases.
With Missouri's improving employment picture, it became increasingly difficult to recruit students to MoSTEMWINs programs. Although employers continue to point to a "skills gap", colleges reported it is often a challenge to convince potential students of the need to acquire additional post-secondary training/education to secure meaningful and sustainable employment. In addition, several colleges reported challenges related to convincing employers that they must play an active role in helping address the skills-gap. In short, colleges alone will not be able to address the employer-noted skills gap.
Maintaining participant motivation and forward momentum in a self-paced, non-term based, open-exit and open-entry program is difficult. Many participants are trying to balance home, work and study obligations and typically study takes a back seat to home and work.
The continued need for local and statewide cohesive model for career and technical education bringing together student support services with credit and non-credit offerings.
Credit for prior learning, non-term-based instruction, and true CBE are not widely accepted, and although such practices hold promise for meeting the needs of adults, with no prior college these practices continue to challenge existing college processes and information systems.
Challenge of integrating industry credentialing into traditional academic programs.

Before moving onto our concluding remarks, let's take a step back to further discuss the value of lessons learned, accomplishments, and challenges. The Missouri Community College Association and its member colleges have acquired a wealth of data, experiences, and expertise during their MSW journey and desires to use this information for continuous improvement and sustaining best practices related to student success. Sustaining change/innovations requires more than a one-time shift in structures and habits. Individual colleges and MCCA may wish to create, embed, and support statewide networks designed to enable the continued creation and dissemination of new knowledge.

In general, post-secondary education is a complex endeavor and efforts to support workforce development for adults with no previous college experience and life-issues does not lend itself to a one-size fits all model. As MSW colleges navigate this fast-paced, dynamic and interdependent world of employer/industry needs, adult retraining needs and life issues, and bureaucratic structures connected to traditional post-secondary formats, they explore structures and systems to expand and improve their efforts. As discussed earlier in this report, the MSW consortium provides an informal network to support peer-to-peer learning. It is our observation that the importance and value of learning from each other cannot be overstated.

Campus presidents/leadership and grant faculty and staff consistently provided comments to support the value of peer-to-peering learning. We conducted a qualitative analysis of these comments and grouped the comments into we have defined as the Four C's of MSW. We suggest that individual colleges and MCCA can build upon the Four C's to create a deeper and more structured statewide learning network. This type of learning network could support the development of each college and MCCA as learning organizations which are skilled at creating, acquiring, and transferring knowledge, and at modifying their behaviors to reflect new knowledge and insights. If successfully implemented and supported this series of learning networks would transform the culture story of Missouri's community colleges from one in which the colleges work together to one in which the colleges learn together.

Conclusion

Cosgrove & Associates' analysis of available data reveals the MoSTEMWINs consortium and its member colleges have engaged with employers and community-based organizations to develop and redesign programs of study. Such program development and redesigned efforts are connected to industry identified and recognized program structures, competencies and credentials/awards. Furthermore, consortium member colleges implemented programs of study and grant strategies with fidelity and used ongoing evaluation results for continuous improvement through the cycle of the grant.

The MSW consortium colleges recognized the imperative to improve their instructional programs and support services to better meet the needs of adult-learners and other grant target populations, including TAA-eligible and Veteran students. To serve and impact these populations, the colleges needed to engage employers to help design new or enhance existing programs of study based upon industry-recognized, stackable credentials to align with existing or emerging STEM-related competencies and career steps. The colleges also understood the need to develop programs of study which could be completed in a condensed/accelerated manner and ultimately lead to employment in the following occupational clusters: Information Technology, Health Sciences, Life Sciences, Manufacturing, and Transportation.

Grant enrollment, program completion, and employment outcome data reveal MoSTEMWINs achieved its stated program outcomes, with the exception of the targeted program completion rate (actual rate of 65% compared to targeted rate of 80%).

- Enrollment of 2,935 surpassed grant target by 58%.
- Grant Program of Study (POS) completers (1,903) surpassed the grant target by 28%. However, the Program of Study completion rate of 65% was less than the grant target program completion rate of 80%.
- Grant Program of Study completers employed at program completion (1,141) surpassed the grant target of program completers employed by 54%, and the employment rate for grant program completers of 60% surpassed the grant target employment rate of 50%.
- Colleges provided college access to unemployed and academically low-skilled adults and other key target groups.
    - Average age of participants was 33
    - 2% were TAA eligible
    - 7% were Veterans
    - 89% were either unemployed or under-employed at program start-up
    - 60% were academically low-skilled at program start-up
    - 41% were enrolling in college for the first-time

- A total of 1,903 participants completed at least one program of study. Counting all program awards and stackable credentials, participants received 3,935 industry-requested awards/credentials.
- Sixty percent of the program completers secured employment upon program completion. Fifty-eight percent of the program completers who started as unemployed secured employment upon program completion.
- Furthermore, through the development and implementation of short-term, career programs, MSW grant participants who enrolled in credit bearing programs of study were more likely than non-grant students in similar credit-bearing programs to complete a program award.

Finally, it is the opinion of C&A that partner colleges and the consortium are taking steps to shift their instructional and student support paradigm to more fully connect to the needs of adult, first-time to college students. Such shifts are allowing for greater connections among: classroom faculty; advisors and instructional support staff; and employers. We have observed changes in organizational practices to enhance student advising, break down barriers between credit and non-credit instruction, expand credit for prior learning opportunities, redesign career and technical programs using industry-recognized stackable credentials, and more effectively onboard and connect students to meaningful career pathways. In addition, we see evidence colleges and the consortium are sharing information and expertise to support both campus-based and statewide scaling and sustainability of successful grant innovations.

Campus presidents and statewide economic and higher education leadership recognize MSW and its sister projects MoManufacturingWINs and MoHealthWINs have created a transformative opportunity for how Missouri's community colleges undertake career and technical education and support the State's workforce development needs. Recognition of this transformative opportunity is an important first step, and the experiences, expertise, and analysis of data associated with Missouri's MoWINs journey should be mined and leveraged to fully benefit from this opportunity. We believe the Missouri Community College Association and its member colleges are well positioned to lead and support the statewide networking and staff development required to continue this transformative process.

APPENDIX

1. **MoSTEMWINs Self-assessment of Implementation Tool – Final, Template.**

Level of Implementation Scale: Please use the definitions below to best represent the level of implementation
Planning but not started - this activity is being planned as part of the grant, but implementation has not begun. Advancing implementation: implementation is occurring on an on-going basis; however, changes or advancements will continue during the grant. Mature implementation: implementation has reached the highest level and no additional changes or modifications are expected during the grant. Sustaining Implementation: the college has made a formal, tangible commitment of resources (budget, people, facilities) to continue this activity beyond the grant. Not Planned: this activity is not relevant to this college's MSW grant.

*Acknowledgment: This toolkit was adapted from the TAACCCT Implementation Evaluation Toolkit created by the Office of Community College Research and Leadership (OCCRL), University of Illinois at Urbana-Champaign (2012), which is copyrighted by the Board of Trustees of the University of Illinois at Urbana-Champaign.

Implementing MoSTEMWINs Strategies: Please select the current level of each MSW strategy using the drop-down menu in column B.		
Strategy 1: Accelerate Entry into Career Programs by refining assessment, transforming developmental education, adding support services to meet needs of TAA-eligible and other participants	Implementation Level as of December 2017	Implementation Level reported Midpoint
Align basic skills and digital literacy with occupational courses and programs		
Accelerate program entry through contextualized courses		
Accelerate program entry through Developmental Education redesign		
Accelerate program entry through Competency-based methods		
Develop a STEM Readiness Portal for entering students providing assessment, career counseling, academic advising, remediation and orientation to STEM programs		
Accelerate program completion through a combination of flexible delivery times and modalities		
Improve online and technology-enabled learning options and hands-on labs		
Adapt career pathway portal to programs		
Enhance advising to participants		
Conduct professional development for faculty and staff		
Connect grant innovations to overall college processes		

Strategy 2: Create Clear Pathways to STEM Careers by expanding access to/developing new stacked and latticed credentials in programs that meet employer needs	Implementation Level as of December 2017	Implementation Level reported Midpoint
Map education and career pathways and stackable credentials		
Identify & validate courses, competencies, and credentials with business & industry		
Articulate Credit for Prior Learning processes for target programs		
Assess and offer credit for prior learning and competencies		
Establish transfer and articulation agreements		
Offer credit for prior learning, noncredit courses, OJT, military experience and other competencies		
Strategy 3: Improve Employment Attainment by working with industry, local WIBs, the state, and community-based organizations to engage, guide, and employ participants	Implementation Level as of December 2017	Implementation Level reported Midpoint
Develop career exploration education for participants		
Career navigators collaborate with WIBs, working on-site when possible		
Enhance working relationship with WIBs and planning councils to recruit, refer, and help place students		
Enhance working relationship with employers and industry consortia to recruit, refer, and help place students		
Enhance working relationship with social agencies to recruit, refer, and help place students		
Enhance career navigation services		
Scale up industry internships		
Assess employer satisfaction with internship programs; modify as necessary		

MoSTEMWINs Stakeholder Engagement: Please rate the level of engagement: Low, Moderate, High, or NA (Not Applicable)

Roles & Responsibilities	College Leaders (president, VP, Deans)	MoWINs Project Leaders	Faculty	Student Support Staff	Students	Employers	Workforce Investment Board / Career Center	Educational (Other Colleges, Trade Schools, 4-years)	Comment
Example Role	N/A	Low	High	N/A	N/A	N/A	N/A	N/A	
Assist with Program Design									
Connect Graduates to Employment									
Identify Industry Workforce Needs									
Identify Necessary Skills and Competencies									
Identify, Access, and/or Refer Participants									
Analyze and Interpret Student Outcome Data									
Validate Curriculum									
Provide Support Services									
Participate in Curriculum Development									
Provide Financial Support									
Provide Intern/Externships, Other Work-Based Learning Activity									
Work to Sustain or Scale Innovations beyond Grant									

Accomplishments	
*Please describe the **Major Accomplishments** that your MoSTEMWINs grant has experienced reported as grant ends*	
1	
2	
3	

Challenges			
*Please describe the **Major Challenges** that your MoSTEMWINs grant has experienced*		*Please describe the **Actions taken** to address these challenges:*	
1		1	
2		2	
3		3	

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