

THE TECHNOLOGY CAREER INSTITUTE
MIRACOSTA COLLEGE
DOL-TAACCT ROUND 3

FINAL EVALUATION REPORT



The Technology Career Institute
MiraCosta Community College
Department of Labor TAACCCT Grantee

Final Evaluation Report

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TABLE OF CONTENTS

Table of Contents.....	3
Executive Summary.....	4
Introduction.....	12
Overview.....	13
Methodology	17
Implementation Assessment.....	22
Impact Assessment	35
Conclusions.....	47
References.....	50
Appendix A: Logic Model.....	52
Appendix B. Evaluation Plan.....	53
Appendix C. Year 3 Evaluation Summary.....	55
Appendix D. TCI Activities and Deliverables	56
Appendix E. Annual Outcome Data	58

EXECUTIVE SUMMARY

The Technology Career Institute

The Technology Career Institute (TCI) was developed using Department of Labor TAACCCT grant funding to expand MiraCosta College's successful, industry-recognized machinist certificate program, to create electronics engineering and robotics/automation certificate programs, and to develop mini-certification programs and courses for incumbent workers. The overarching goal of establishing TCI was to provide a dedicated facility that would help increase attainment of certificates, certifications, and other relevant credentials that match the skills needed by local employers and better prepare non-traditional learners for high-wage, high-skill jobs.

TCI utilized a combination of several evidence-based approaches to achieve this goal, including the components of Jobs for the Future's "Breaking Through" approach: 1) *Accelerated Learning* to meet the needs of working adults; 2) *Comprehensive Support Services* to improve student persistence and success; 3) *Labor Market Payoffs* to assure specific economic outcomes through alignment of skills and credentials with industry needs; and 4) *Integration and Program Alignment* to create multiple paths leading into and through occupational and technical degree programs (Leibowitz, 2004).

TCI aimed to serve 695 participants over the course of the grant period, including TAA-eligible workers, veterans, the unemployed and underemployed, and incumbent workers looking to upgrade or increase job skills and obtain credentials that open up opportunities for career advancement and qualify them for higher-paying positions. While this target number was not met, evaluation of the implementation and impact of TCI shows that it has been a success by many other measures.

Evaluation Design

The goals of the evaluation were 1) to document, assess, and provide formative feedback on program implementation; and 2) to analyze the impact of program participation on educational and employment outcomes.

The *implementation analysis* studied both the progress of planned program implementation and developments that arose throughout program rollout. This analysis utilized a number of

evaluation methodologies including site visits, observation of meetings, programs, and classes, student surveys and focus groups, industry partner questionnaires, document reviews, and key stakeholder interviews.

The theory of change was that the implementation of TCI, including the development of a dedicated training facility, curricula, instruction, assessments, support services, and industry and workforce partnerships, would provide targeted populations with access to technical training geared specifically for their needs, which would in turn fulfill industry demand for skilled workers. This theory informed a logic model that served as a roadmap for assessing program implementation. Data gathered from students, instructors, administrators, and industry partners was regularly shared amongst stakeholders to responsively align program delivery and development with this model, and this data also informed the implementation analysis.

The analysis focused on four areas of program implementation suggested by the research questions in the Department of Labor’s Solicitation for Grant Applications: 1) program development, 2) program delivery, 3) assessments, and 4) partner contributions. The research questions were contextualized within these areas to reflect the specificity of TCI:

- 1) How were program curricula, instruction, and credentialing designed and modified to offer accelerated learning, stacked and latticed education, and career training appropriate for working adults?
- 2) How did program structure and administration work to support and enhance student success?
- 3) How were assessments conducted to identify potential participants, gauge their abilities, and assist them in accessing and completing programs?
- 4) How did industry, workforce, and other community partners contribute to program development?

The *impact analysis* examined the effect of participation in TCI programs on education and employment outcomes, including program retention, attainment of credentials, post-program employment, and wages. Statistical analysis of data gathered from TCI administration, program participants, and the Department of Labor before, during, and after program dosage produced

inferential findings on participant outcomes. The impact analysis also explored systems change enacted by TCI at MiraCosta College (MCC) and within the broader community that it serves, drawing on data gathered from TCI and MCC administrators and industry and workforce partners.

The hypothesis regarding education and employment outcomes was that technical training geared specifically to the needs of targeted populations would improve program retention, skill development, and attainment of credentials, and increase the rate of employment, job retention, and wages of participants. The hypothesis regarding systems change was that successful development and implementation of TCI would require substantial buy in and involvement from MCC administration and from industry, workforce, and community partners, and that this would in turn have a significant impact on the policy, processes, and relationships at play in the area of Career and Technical Education (CTE) in San Diego County.

The analysis focused on three key areas of impact: education, employment, and systems change. The research questions specific to each area are as follows:

- 1) What is the impact of TCI programs on participant rates of retention, development of skills, and attainment of credentials?
- 2) What is the impact of TCI programs on post-program employment, job retention, and wages of participants?
- 3) What is the impact of TCI on the policies, processes, and relationships of industries, institutions, organizations, and other key stakeholders invested or involved in technical education and training in San Diego County?

Implementation Findings

A comprehensive evaluation of program implementation detailed through the strategies and activities employed in establishing TCI was provided in the interim evaluation report. In terms of fidelity to the DOL-approved Statement of Work, all strategies have been implemented and all activities and deliverables completed. Overall, implementation analysis found the following:

- TCI successfully developed programs that offer a fast track to acquiring technical skills, certificates, and certifications in demand by local industries. These include: 1)

an expanded 13-week Machinist Technology program; 2) a 15-week Engineering Technician program; and 3) dozens of mini-certificate programs and incumbent worker courses, many of which offer relevant industry certifications.

- **TCI programs were structured and administered to offer comprehensive support to students to assist in enrollment, study, career planning, and job placement.** Outreach and advising helped identify and intake viable program candidates, while tutoring and basic skills coursework provided remediation for students needing academic assistance. The grant-funded workforce navigator worked closely with students in navigating career pathways, including program selection and completion, financial assistance, credentialing, and the job search, application, and interview process. The workforce navigator also worked closely with local industry partners to assure student opportunities for site visits, job shadowing, internships, and job placement.
- **TCI developed a process of assessment that used appropriate tools for identifying participants and tracking their progress toward program completion.** This includes initial assessments with WorkKeys to measure "real world" work skills such as discipline, teamwork, customer service, and managerial potential, and with the Comprehensive Adult Student Assessment Systems (CASAS) to evaluate reading comprehension, mathematics and writing skills, critical thinking skills, and basic communication skills. These helped to gauge participant potential, and where appropriate, to steer students into remediation. Program specific assessments were developed for gathering data on knowledge and skills acquisition, so that student progress could be tracked and programs calibrated to student needs.
- **TCI formed strong industry and workforce partnerships that were crucial to program development.** Advisory committees comprised of industry and workforce representatives have provided valuable feedback on curricula, assessments, and credentialing. More than 40 local employers have contributed to TCI by offering tours of their facilities and job shadowing opportunities, by being guest speakers and teaching classes, and by donating tools, equipment, and supplies. Other community

partners have contributed over \$500,000 in grants and donations that have been leveraged to help equip the facility, develop programs, and attract and retain students.

Participant Impact and Systems Change

The successful development of TCI as a dedicated career and technical training institute promoted substantial systems changes at MCC and within the broader community it serves, while the programs implemented at TCI had significant impact on education and employment outcomes of participants. Highlights of impact findings documented in three key areas are:

- The collective impact of the collaborative efforts of TCI staff, MCC administration, local government, and industry, workforce, and community partners has beneficially reshaped policy, processes, and relationships scaffolding the delivery of CTE in San Diego County. The success of TCI was leveraged by MCC to promote and to garner the support of local industry and civic groups for a college bond measure that will generate \$455 million for upgrading instructional technologies and constructing career training facilities. Industry partners are shifting from an advisory role to direct participation in the processes of developing and delivering programs, courses, and curriculum, tightening their integration with TCI and making CTE more responsive to the changing needs of local employers for skilled workers. These partners have increased their alignment with the vision, agenda, goals, objectives, planning, and outcomes of TCI programs by 26%, and their investment in communication, planning, decision-making, and sharing of ideas, information, and resources with TCI by 29%, which signals their commitment to the success and sustainability of TCI.
- TCI programs have achieved exceptional rates of student retention and have successfully helped participants develop skills and earn credentials necessary for employment in local industries. 98% of those who enroll at TCI complete their programs of study. Self-assessments of participant skills pre- and post-program show improvement in almost areas, including an 11% increase in basic math skills, an 8% increase in perceived ability to anticipate problems, and a 13% increase in leadership skills. The annual number of TCI program participants earning certifications increased 92% over the

four-year grant period. 50% of all participants in TCI programs had earned credentials at the end of this period.

- **The quality of TCI programs has improved the hirability of TCI graduates and significantly increased both their rate of job retention and their wages.** There was a 32% increase in the employment rate of TCI program participants over the course of the four-year grant period, and a 28% increase in job retention. 86% of participants were employed upon program completion, and of those employed, 82% were working in fields related to their program of study. There was a 7% increase in the wage rate of all program participants, with a 9% increase for those in the Machinist Technology program and a 13% increase for those in the Engineering Technician program. Wage increases were highest for those in the 10th percentile of income earners, at 61%, as compared to a 1% decrease in wages for those in the 90th percentile.

Conclusions

MiraCosta College successfully established TCI as a dedicated career and technical training institute offering certificate programs and classes that provide workers with the skills and credentials needed to attain and retain high-wage employment in jobs needed by manufacturing and technology industries in San Diego County. The process of implementing TCI had a positive impact on the local system that provides CTE. In assessing the implementation of TCI and its impact on participant outcomes and systems change, the evaluation team documented four key lessons relevant to the sustainability of TCI specifically and to CTE programs in general.

- **Industry support comes in unconventional and unexpected ways; looking for and leaning into that support expands opportunities for program development.** By not adhering tightly to initial assessment of industry needs, TCI was able to be agile in program implementation, engaging in ongoing dialogue, responding to advisory input, and enabling participation of industry partners. Both program participants and industry benefitted as TCI classes and programs adapted to the changing needs of local employers for skilled workers.
- **Comprehensive and versatile support services are crucial for participant intake, retention, and employment upon program completion.** TCI's grant-funded workforce

navigator took on many unanticipated roles that helped guide students from the point of initial contact to getting a job in their field of study. These included not only the provision of intake interviews, orientations, and career counseling, but also the function of industry liaison, channeling feedback into the development of supportive program components like assessments and remediation, and securing opportunities for job shadowing, internships, and employment.

- **Systems change is necessary to embed new programs and to sustain them over time.** Collaborative efforts between academic, government, industry, workforce, and community partners had a positive impact on the established system of CTE provision in San Diego County. Partner alignment through a common agenda, continuous communication, shared data, and mutually reinforcing activities promoted this collective impact, and the resultant changes to the system enabled the success and sustainability of TCI.
- **CTE programs need to align and integrate with the needs of local workforce groups.** Although TCI worked diligently to solicit feedback from local TAA, WIB, and Veterans group representatives, very few eligible applicants were channeled into TCI programs by these organizations. The evaluation team was unable to determine why, but possible reasons include 1) decreasing unemployment over the course of the grant period, and 2) lack of interest or follow through by those directed to TCI by these organizations.

The evaluation also identified three implications for future workforce and education research:

- **Access to administrative records and sharing of data needs improvement.** Especially in California and other states where disaggregated Department of Labor is not available, similar programs need to develop workalike partnerships that facilitate data sharing. Disidentification of individualized data would allow for the ethical creation and population of a public database useful for workforce and education research and invaluable for evaluation of career and technical training programs.
- **Case studies of programs implementing selected strategies and best practice should be considered as a viable and valuable research method.** The rigorous research design standards imposed by the Department of Labor suggest that there is nothing to be

learned outside of randomized control trials or comparison group studies, which devalues important lessons from the field. Smaller, more agile studies developed through prototyping would better reflect on-the-ground changes during program implementation, and would afford the responsive adaptation necessary for successful program start-up.

- **Better alignment between program implementation and evaluation is needed.** This could be facilitated by conducting orientations with all grantees during their first federal meeting to promote and reward closer relationships between program staff and evaluators, and by advocating their attendance at annual meetings to build relationships and dialogue. This is particularly necessary for new programs in which time and attention is focused on program startup. Encouraging the use of cost benefit analysis, evidence briefs, and white sheets would also help by making measures of program implementation and impact more accessible to all stakeholders. Such alignment would yield better research design, data collection, and reporting.

INTRODUCTION

Backed by a \$2.75 million, four-year grant awarded in 2013 from the U.S. Department of Labor, MiraCosta College (MCC) developed the Technology Career Institute (TCI) as a dedicated facility for the expansion of their small but successful, industry-recognized machinist certificate program, the creation of industry-needed engineering technician and robotics/automation certificate program, and the development of industry-responsive classes and mini-certificate programs to increase incumbent worker skills. This grant-funded program resulted from collaboration between MCC, the San Diego Workforce Partnership (SDWP), the North County Coastal Career Center (NCCCC), and a number of a community and business organizations.

The Department of Labor grant initiative required an independent evaluator to address 1) program implementation and 2) program impact and participant outcomes. This final evaluation report presents the finding of implementation and impact assessments conducted by Hoffman Clark + Associates (HCA) over the course of the four-year grant period.

The report is organized as follows:

- **Overview.** Provides background on the TAACCCT grant program and the development of TCI by MCC, as a grant recipient, in response to local industry demand for skilled technical workers.
- **Methodology.** Summarizes the comprehensive approach to the evaluation, including the tools and data sources used, the focus on particular strategies, and changes in approach in response to unanticipated limitations.
- **Implementation Assessment.** Summarizes key points from the Implementation Analysis submitted as the Interim Evaluation Report, focusing specifically on the development of certificate programs, support services, assessments, and partnerships.
- **Impact Assessment.** Documents the impact of TCI on educational and employment outcomes of participants, and also on systems change at MCC and within the broader community it serves.

- **Conclusion.** Offers final evaluative observations on TCI as an institution dedicated to providing technical education and training, including suggestions for continued sustainability and future research.

OVERVIEW

The Trade Adjustment Assistance Community College and Career Training (TAACCCT) grant program was created under the 2009 American Recovery and Reinvestment Act. In 2010 Congress appropriated \$2 billion over four years for the U.S. Department of Labor to fund the program. The goal of TAACCCT is to expand training programs for the unemployed, particularly TAA-eligible workers and veterans, and to move these workers into high-wage, high-skill jobs in high-growth industry sectors. TAACCCT provides eligible higher education institutions with funds to expand and improve their ability to deliver accelerated education and career training programs that prepare program participants for high-skilled, high-wage employment. TAACCCT also aimed to increase the number of workers earning certificates, certifications, degrees, and other industry-recognized credentials.

A TAACCCT Round 3 grant supported the development and implementation of the Technology Career Institute (TCI). Prior to receiving the TAACCCT grant, MiraCosta College (MCC) had been approached by the National Tooling and Machining Association (NTMA), The National Institute for Metalworking Skills (NIMS), the local WIA career center, and 25 local industry representatives to develop a program to address shortages in the workforce by quickly training qualified machinists and toolmakers. Launched in 2013, the success of the initial machinist training program drew the interest of both the San Diego Chapter of the Electronics Representatives Association and The Maritime Alliance, who asked MCC to develop training programs for specialized technicians needed in their respective industries. In career fields related to these industries, more than 2,000 job openings are projected annually in the San Diego region, with 14% growth over the next 10 years. TCI was created in response to this industry need for skilled workers.

While there are other options for training, including machinist apprenticeship programs and two and four year college degree programs in electronics engineering and robotics/automation, there are no other accredited programs providing short-term, fast-track training that give workers the occupational skills, critical thinking capabilities, and hands-on experience necessary for immediate entry or re-entry into the workforce. Such accelerated training is particularly needed in San Diego County, which has a substantial population of TAA-eligible workers and veterans who have valuable skills and experiences needing updating, credentialing, or translation into a civilian context in order to be competitive in the workforce and in emerging industries, yet who do not have time to devote to long-term education or training programs.

TCI provides a dedicated facility for fast-tracking the skill development and credentialing needed by local industries through: 1) the expanded Machinist Technology program, which provides a 13-week training in shop math, blueprint reading, precision measurement, fixture tooling, machining setup and operation, and basic CNC programming, and offers a machinist certificate, OSHA-10 certification, a NCRC certificate, and optional NIMS certification; 2) an Engineering Technician program, which provides a 15-week training in electronics, mechanical systems, fluid mechanics, robotics, automation, and programming, and offers an engineering tech certificate, OSHA-10 certification, a NCRC certificate, and RF certification; and 3) a number of programs and courses that provide training and certification in areas such as Electronics Assembly, CNC Programming, SolidWorks, Precision Measuring & Blueprint Reading, Welding, and Robotics, and can be stacked toward a more comprehensive certification.

The goals of TCI were to:

- 1) Increase attainment of certificates, certifications, degrees, and other relevant, industry-recognized credentials that match the skills needed by local employers and better prepare program participants for high-wage, high-skill employment or re-employment in manufacturing industries;
- 2) Introduce innovative and effective methods for developing curriculum and delivering instruction that is responsive to the needs of TAA-eligible workers, veterans, the unemployed and underemployed, and incumbent workers, and places participants in appropriate career and/or education pathways; and

- 3) Demonstrate improved employment outcomes by aligning curricula, instruction, credentials, and career and education pathways with local industry needs.

More ambitiously, TCI aimed to not only train participants and demonstrate improved employment outcomes through innovative methods, but to also leverage MCC's social capital to build a state-of-the-art technical training facility and enact systems change within the college and the broader community it serves. TCI set out to accomplish these goals through the following strategies:

Strategy 1. Program Start-Up.

- 1.a Build an infrastructure that supports strong industry connection and input from previous TAACCCT awardees.
- 1.b Develop and align curricula to industry needs, using evidence-based models and National Certification standards.
- 1.c Coordinate with TAA rep, Veterans rep, and local One Stops to collaborate on identifying potential students, assessment strategies, and service needs.
- 1.d Prepare an inviting state-of-the-art facility conducive to accelerated and blended learning, job readiness, and skills development.

Strategy 2. Deliver Instruction.

- 2.a Student recruitment with planned assessment and remediation tools available.
- 2.b Coursework implementation utilizing "Breaking Through" approach through Accelerated Learning, Comprehensive Support Services, Labor Market Payoffs, and Aligning Programs for low-skilled adults.

Strategy 3. Articulation and Stackable Credentials.

- 3.a Create course certifications for developing competencies that are recognized by industry.
- 3.b Establish work experience, internship, and job placement services.
- 3.c Create educational and career pathways for TAA eligible workers, Veterans,

and other adults.

Strategy 4. Evaluation.

- 4.a Course evaluation using data and industry input for continuous improvement.
- 4.b Project evaluation, including comparison cohort.

During Year 1 (2013-14) TCI focused on the expansion of the existing Machinist Technology program, exploring best practices for technical education at community colleges, planning for startup of the Engineering Technician program, and negotiating the move of TCI to a new facility. In Year 2 (2014-15) the new facility was opened with both the machinist and engineering programs fully operational. Year 3 (2015-16) and Year 4 (2016-2017) were devoted to calibrating the programs based on feedback from students, instructors, employers and other industry and workforce partners, and also to developing other programs and pathways for incumbent workers to enhance skills needed by local industries. In these four years, TCI has evolved from a small pilot program temporarily housed in a local community center to a large, dedicated facility that is recognized by industry partners for the quality of training provided.

TCI utilized a combination of several evidence-based programs to help ensure this success, including the components of Jobs for the Future's "Breaking Through" approach (Leibowitz, 2004):

- **Accelerated Learning.** "Short-term intensive learning programs enable adults to make rapid progress and complete programs more quickly," which "strengthens persistence by enabling students to see progress," and "meets the needs of working adults."
- **Comprehensive Support Services.** "Research suggests that career counseling, advising, academic and social supports, and case management improve the persistence and success of low-income, low-skilled adults in community colleges."
- **Labor Market Payoffs.** "Organized around strong partnerships with employers" and "driven by employer skill needs and local economic development priorities," programs "that link skills and credentials to specific economic outcomes are critical to the persistence and success of low-income working adults."
- **Integration and Program Alignment.** "To serve students with low basic or pre-college

skills," programs need to be designed "in order to integrate adult education, workforce development, developmental education, and noncredit programs and create multiple paths leading into and through occupational and technical degree programs."

TCI also employed the Workforce Navigator Model to provide individual support and assistance to help participants pursue their career pathways (Workforce Development Council, 2011), the Emporium Model for Math Instruction, which focuses on providing students with individualized math tutoring, interactive math software, and one-on-one instruction (Twigg, 2011), and successful strategies from the Machinist Technology program pilot, including educational and job-readiness pre-assessments, blended and accelerated learning, immersive instruction, job shadowing, and employment coaching.

METHODOLOGY

The comprehensive evaluation of TCI included formative feedback on the progress of program implementation and an analysis of program impact and participant outcomes. The methodology and approach to these assessments is described below.

Implementation Analysis

The implementation analysis focused on program start-up and development, and was informed by the program goals and strategies for assessing progress towards these goals and all other measurable impacts and mandated outcomes. The analysis produced a comprehensive picture of the development and rollout of the program, while also providing ongoing evaluative feedback that contributed to program improvement as the program matured (Maxwell, 2013).

The inquiry framework for assessing the implementation of TCI was Developmental Evaluation, which is designed to capture all emergent program components (Patton, 2011). This bottom-up method of evaluation supports the theory of change for new and developing programs by tracking their fidelity to strategies and goals in order to monitor adaptations and changes as they arise in response to data collected and lessons learned (Chen, 2009).

The theory of change was that successful implementation of TCI would provide TAA-eligible workers, veterans, the unemployed and underemployed, and incumbent workers with access to technical training geared specifically for their needs, which would in turn have a positive impact on education and employment outcomes of participants while also fulfilling industry demand for skilled workers. This theory informed a logic model that served as a roadmap for assessing program implementation. See Appendix A. Data gathered from students, instructors, administrators, and industry partners was regularly shared amongst stakeholders to responsively align program delivery and development with this model, and this data also informed the implementation analysis.

Data was collected over the course of the four-year grant period using a number of evaluation tools including site visits, focus groups, surveys, and interviews. Data collection was determined by the evaluation questions proposed in the evaluation plan. Table 1 lists data collection tools. Appendix B summarizes evaluation questions, methods, and data sources.

Several data points were added during program implementation based on stakeholder feedback.

A pre-post student questionnaire was developed based on established workforce readiness assessments and measures of program satisfaction. Questions were derived from standardized Career Training Instruments to track student confidence and soft skill acquisition (O'Neil, 2014). A self-reflective Implementation Analysis Rubric was also completed by key program staff at the end of Year 3 to validate their sense of program progress (Blase, 2013). Data was shared through periodic meetings, which occurred more frequently early in the program and less often as the program ramped up, and also through annual Evaluation Summary white sheets. See Appendix C for an example from Year 3. This feedback helped inform program development.

Table 1: Data Collection Tools

- Observation of meetings
- Interviews with industry representatives
- Industry partner surveys
- Student focus groups
- Student interviews
- Student questionnaires
- Classroom observations
- Interviews with program instructors
- Key staff interviews
- Document reviews

Impact Analysis

The evaluation plan initially called for a quasi-experimental approach through a Nonequivalent Comparison Group Design that would examine the effectiveness of treatment by comparing outcomes of those enrolled in TCI programs and those enrolled in similar one or two year programs (Shaddish, 2002; Campbell, 1966). Numerous attempts were made to enlist help in gathering comparison group data from the TAACCCT grant coordinator at a local community college that offers a two-year Machinist Tech program. The program coordinator also contacted a program evaluator from a TAACCCT Round 2 grant who had contacted the Department of Labor, and learned that disaggregated data on individual participants could not be shared. TCI leadership and the evaluation team together decided that the collection of comparison group data was neither feasible nor would it support the evaluation proposed. Impact analysis is instead based on the following data:

- ***Department of Labor Data.*** Due to California privacy laws, the Department of Labor cannot share employment data for individuals, but only for aggregate populations. The evaluator worked with the Department of Labor and the California Department of Industrial Relations to access aggregated UI data for TCI program participants. These data include employment following program completion, employment retention, and wage increases for incumbent workers participating in the program.
- ***TCI Data.*** Participant outcome measures were also pulled from Apricot, as was data on industry partners. This database was implemented in Year 2, as the original database was determined to not meet the needs of the program. All existing data components were combined within Apricot, including those for program participants and partners. Participant data includes assessments, retention, credentials, and self-reported employment, while partner data provides indicators of participation and contribution.
- ***Independent Evaluation Data.*** The evaluation team collected student pre-post program data for each of the cohorts, which provides self-reported measures of education and employment outcomes. Surveys of TCI staff and industry partners

provide measures of impact on systems change at MCC and within the community it serves.

All data relevant to participant outcomes and systems change was analyzed in SPSS to test for correlations, probability, and significance as appropriate, and examined for pre-post differences in participant and stakeholder metrics. Meeting all tests for normality of distribution ensures significance and allows for inferences that suggest correlation in line with proposed hypotheses, but not causation.

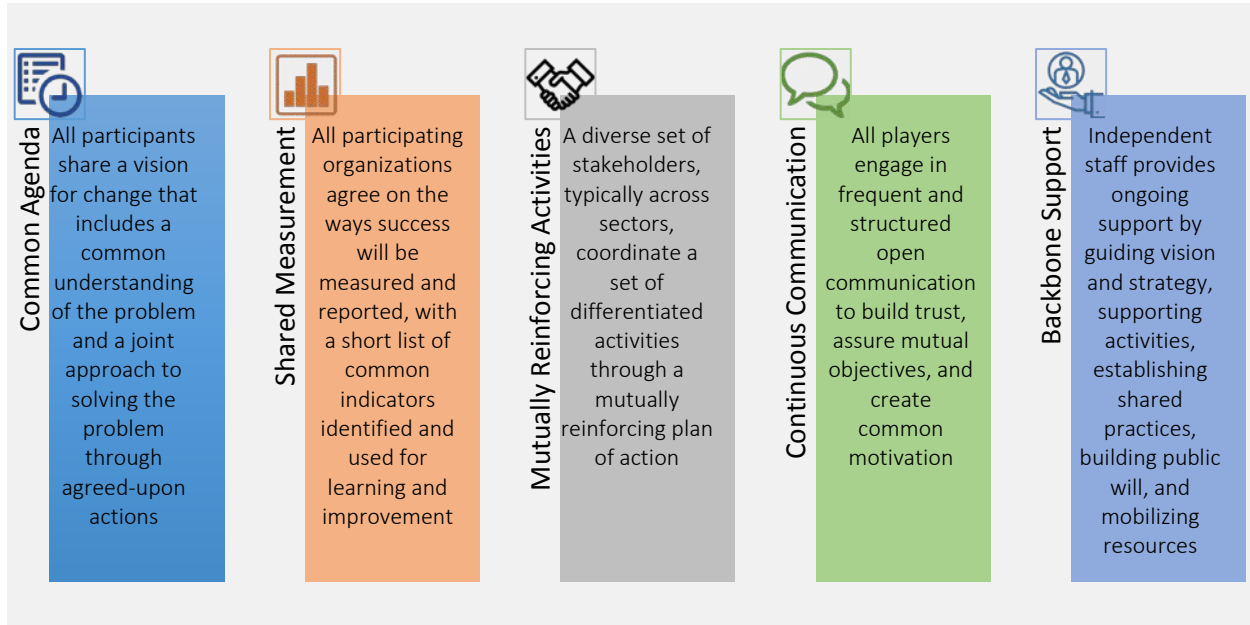
The successful implementation of TCI and its impact on participant outcomes would not have been possible without systems change at MCC and within the community it serves. The overriding questions pertinent to evaluating such change were:

- 1) How did TCI position itself in meeting the needs of industry and workers?
- 2) How did TCI affect the ability of MCC to attract students, and to engage local business and civic communities in an effort to enact and sustain overarching change?
- 3) How did TCI impact policies, processes, and relationships at play in the area of technical training in San Diego County?

TCI leadership was very strategic in working with all MCC departments from the beginning of planning, soliciting cooperation and promoting collaboration rather than competition. TCI also collaborated with industry partners and social service organizations to ensure that their needs and the needs of workers were being met. The evaluation has attended to these collaborative efforts to assess the impact and sustainability of TCI and also systems changes within the program and its broader institutional contexts as it has been implemented.

Through feedback from staff and industry, and through direct program observation, the questions regarding systems change and sustainability were examined through the lens of Collective Impact (Kania, 2011). Collective Impact was an appropriate model for assessing the contributions of partners who were essential components of TAACCCT grant-funded programs. The five components of Collective Impact were incorporated into the systems evaluation to scaffold mechanisms for analyzing the impact of collaborative partnerships (Preskill, 2014). See Figure 1.

Figure 1. Five Components of Collective Impact

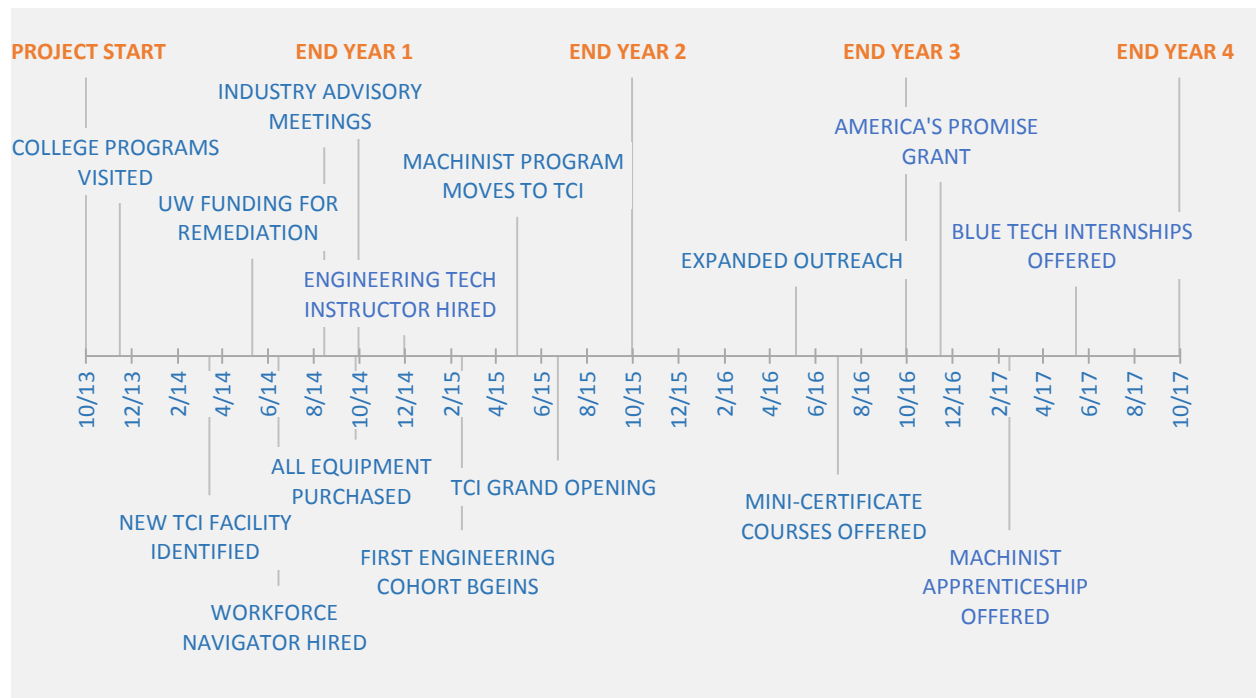


Utilizing instruments for measuring Collective Impact, the evaluation team created rubrics for assessing and tracking partner alignment with and investment in TCI in terms of these five essential components. Measurement was conducted in Years 1, 2, and 3. Additional measures of systems change were collected at the academic, civic, and policy levels. Engagement with non-conventional partners was also examined as TCI built capacity and enhanced its public presence.

IMPLEMENTATION ASSESSMENT

The positive impact of TCI on education and employment outcomes of program participants and also on MCC and the local community results from successful implementation of all activities proposed to achieve its strategic objectives. Appendix D provides an at-a-glance assessment of program activities and deliverables, while Figure 2 offers a timeline of major implementation milestones.

Figure 2. TCI Milestones



Implementation analysis focused on four areas of program implementation suggested by the research questions in the DOL’s Solicitation for Grant Applications: 1) program development, 2) program delivery, 3) assessments, and 4) partner contributions. The research questions were contextualized in these areas to reflect the specificity of TCI:

- 1) How were program curricula, instruction, and credentialing designed and modified to offer accelerated learning, stacked and latticed education, and career training appropriate for working adults?
- 2) How did program structure and administration work to support and enhance student success?
- 3) How were assessments conducted to identify potential participants, gauge their

abilities, and assist them in accessing and completing programs?

- 4) How did industry, workforce, and other community partners contribute to program development?

Summary assessments of implementation within these four areas are reported here; a comprehensive assessment of the implementation of TCI detailed through program strategies and activities was provided in the Interim Evaluation Report.

Program Development

The TCI team visited 13 colleges in eight states during Year 1 to see how they were implementing advanced manufacturing and mechatronics programs. The colleges, some of which were prior TAACCCT grantees, were generous in sharing best practices, which informed TCI program design and reduced the likelihood of ‘reinventing the wheel’ during program development. Practices adapted from these programs included: industry involvement in developing curriculum and providing feedback, provision of job shadowing and internship opportunities, creating articulated, stackable, and latticed learning, credentials, and certificates, provision of coaching and peer support, and establishing partnerships with local workforce organizations. Some of the programs also shared curricula they had found effective. TCI continued to meet with other TAACCCT grantees throughout the grant period, learning from practices they employ, in addition to applying learning from their own program evaluation to guide ongoing program development.

Rollout of core coursework began in Year 1 with development and delivery to the first cohort of the Machinist Technology (MT) program. The electro-mechanical and robotics/automation

Running an accelerated program is a great way to go. It gets students very engaged at a high level. You can get through a lot of curriculum in less instructional hours than in a credit setting. It emphasizes skill sets and troubleshooting in the workplace.

– TCI Administrator

components of the Engineering Technician (ET) program were implemented in Year 2. The accelerated learning that these programs offer, with an emphasis on hands-on development of valuable workplace skill sets, has been reported by students in surveys, interviews, and focus groups conducted by the evaluator as a

significant reason for enrollment and an important factor in student retention and success.

By Year 3, TCI had added more than 20 courses offering incumbent workers opportunities to update or expand their skill sets. In addition, TCI created five mini-certificate programs, which when stacked can lead toward a more comprehensive certification. The mini-certificates are in SolidWorks, Electronic Assembly, CNC Programming, Precision Measuring & Blueprint Reading, and Robotics. The addition of these programs allowed TCI to expand incumbent worker enrollment and offer additional national certifications.

Highly qualified instructors for the MT and ET programs were recruited in Year 1. The ET instructor was replaced in Year 2, and an instructor for incumbent worker programs was hired. In Year 3, more incumbent instructors were hired to teach machining, soldering, electronics, electro-mechanics, SolidWorks, manufacturing fundamentals, and other higher-level courses.

The MT and ET instructors have proven themselves popular, effective, and successful at teaching the skills students need to succeed in these fields. In classroom observations conducted by the evaluator, the ET instructor effectively employed a range of pedagogical practices – from interactive logic quizzes to hands on engineering projects – that engaged students in the learning process, imparted necessary theoretical knowledge, evaluated student progress, and built confidence, camaraderie, and organizational skills. In a focus group conducted with a MT cohort, all of the students expressed approval of the program and related positive experiences with the MT instructor and the curriculum.

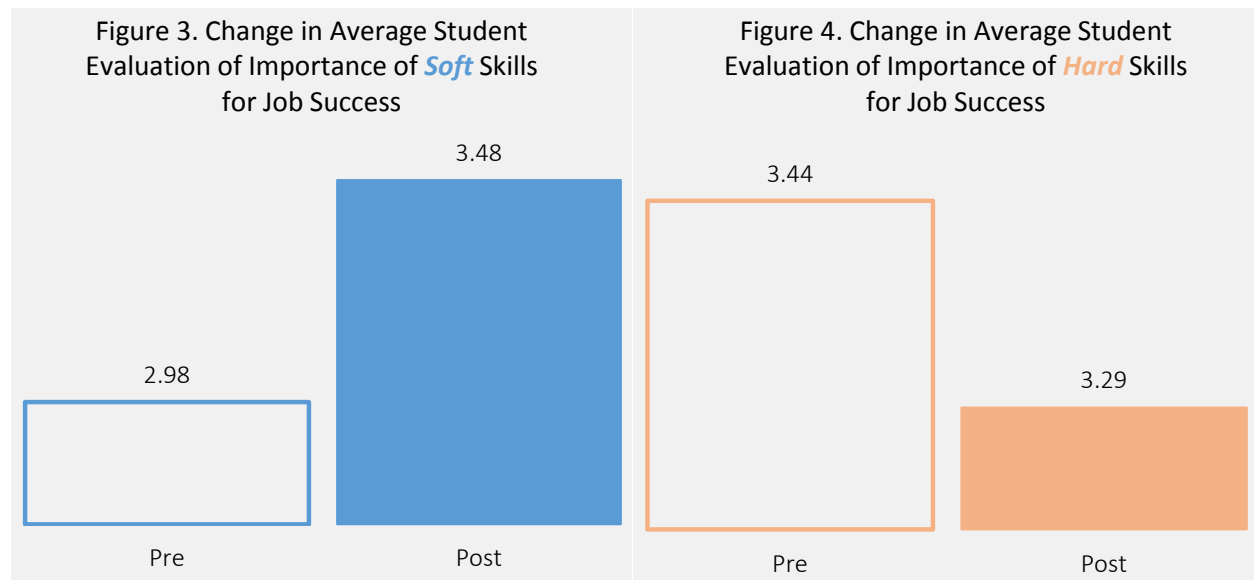
The development of the MT program curriculum was sensitive to alignment with NCRC and NIMS standards. The MT instructor also paid attention to the needs of students in alignment with emerging local manufacturing needs. Development of incumbent worker program and course curricula was also informed by relevant certification standards and the needs of local industry. Due to the absence of national creditable standards in curriculum for engineering technician certificates, the ET instructor relied on his extensive instructional background and industry experience. Key to success was the development of a curriculum that was responsive to input of industry partners and relevant to students' needs for hands-on learning. All program curricula has been developed through an ongoing, iterative process guided by reviews by academic and industry partners, regular meetings with instructors, observations of classroom dynamics, and student evaluations.

Advisory board review of curricula began in Year 2, and has been supplemented with feedback gathered at meetings with employers, workforce representatives, and other industry partners, as well as during workplace site visits and other impromptu exchanges between key stakeholders. This feedback has been invaluable in ongoing curriculum development.

Keep the focus on business applications in order to keep the instruction narrow, and do not forget the soft skill sets such as collaboration and problem solving.

– Industry Partner at ET Advisory Board Meeting

For example, input from the ET Advisory Board suggested the importance of helping students develop the 'soft skills' necessary for business applications. This focus has been incorporated into the program by the ET instructor, and the change in student recognition of the value of 'soft skills' relative to 'hard skills' can be seen below.



Students were asked to evaluate the importance of 13 different skills for job success. Responses were weighted: Highly Important = 4, Very Important = 3, Important = 2, and Not Very Important = 1. Weighted responses were averaged across all cohorts. Figures 3 & 4 reveal a polarized shift in students' evaluation of skills, as they came to recognize the importance of 'soft' skills such as communication, critical thinking, teamwork, project management, workplace safety, and customer service in relation to 'hard' skills like math, reading schematics, technical writing, prototyping, operating machinery, electronics, and robotics.

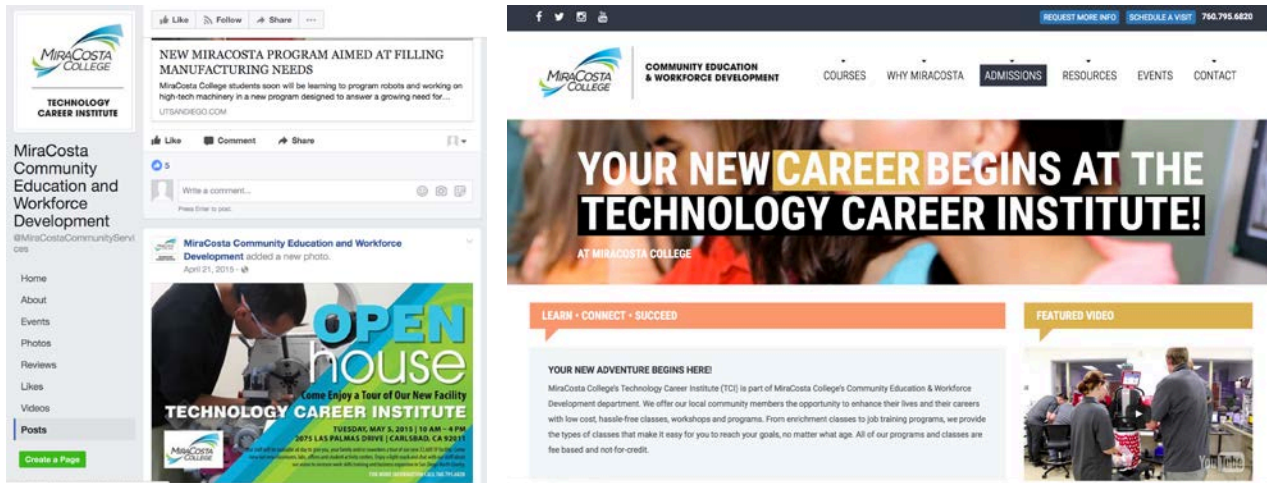
Program certification was delayed following a survey of local industries that found only 27% wanting employees to be certified. Certification requirements were reviewed and discussed with institutions that use NIMS, and the value of national certification was discussed with numerous schools and industry representatives. Curricular alignment with certification standards began in Year 2, and NCRC certification was added to both the MT and ET programs at the beginning of Year 3. RF certification was also added to the ET program. AWO certification is now offered in welding, and IPC-A-610 certification in electronics assembly. The Machinist instructor is now using NTMA online coursework to compliment classroom work, and is working on updating curriculum for NIMS approval.

Program Delivery

The delivery of TCI programs has been crucial to supporting and enhancing student success. Outreach and advising have helped identify and intake viable program candidates. Remediation efforts have worked to ensure the continued participation of incoming students who score low on basic skills assessments, and have also had an impact on attendance and punctuality. Engaging students in planning their career path has also helped retention, as have the provision of job shadowing, internship, and apprenticeship opportunities. These strategies have proven effective, with 98% of participants completing their programs as of the end of Year 3.

Outreach efforts included establishing a social media presence on Facebook through MCC's Community Services page (<https://www.facebook.com/MiraCostaCommunityServices/>) and the creation of a dedicated TCI website (<http://tci.miracosta.edu/>). See Figures 5 & 6. With over 700 followers, the Facebook page facilitates direct communication with local community about class offerings, program progress, success stories, and information relevant to technical careers and workforce development. The website provides information about available courses and programs, and links for requesting more information and scheduling a visit. Working with professional workforce videographers, the dynamics and potentials of the new grant-funded programs and classes were captured on video and shared on Facebook, the TCI website, and YouTube (<https://www.youtube.com/watch?v=MSGF6TfsEyK>).

Figures 5 & 6. TCI's Facebook and Website



The Open House and Grand Opening of the new TCI facility in Year 2 were tremendously successful outreach efforts, with more than 200 participants representing the local community and industry partners. TCI also held a 'Manufacturing Day' event in the end of Year 2, which was open to the public and industry representatives and included a number of opportunities to participate in hands-on activities that demonstrated the extensive resources available at the newly opened facility. A second Open House was held during Year 3 to celebrate the first anniversary of the new facility, and weekly tours continue to be offered to encourage student enrollment.

In Year 3, TCI substantially increased outreach to local high schools. This included a breakfast meeting with 25 counselors, which was followed by several additional breakfasts. TCI has also given presentations at schools and at college and career fairs, and has worked with local high schools and Junior Achievement to offer tours of the facility. Finally, TCI launched the first Youth Robotics BAXTER Competition in Year 3 as a way to both recruit high school students and showcase the TCI program in the community.

TCI was able to significantly improve marketing materials in Year 3 with the help of a graphic designer. See Figures 7 & 8. These new materials address outreach to both students and industry partners, while work with a marketing group and the help of a social media intern has continued to expand TCI's social media presence.

Figures 7 & 8. Improved Marketing Materials



Advising and career planning began with hiring and training the workforce navigator in Year 1. Through outreach and networking with local businesses, he has helped create recognition of TCI, kept abreast of industry needs, and established opportunities and pathways into industry for students. Along with the Program Coordinator, the workforce navigator developed educational intake forms in Year 2 that help to determine career pathways of students prior to program entry. The workforce navigator continues to work closely with students before, during, and after their time at TCI to help ensure that their efforts lead to career or further educational opportunities. Students thus receive customized support that is aligned with what employers have told TCI they need: leadership skills, work preparedness, interviewing skills, tutoring, skills navigation, financial aid, communication skills, and job placement. 96% of students in the MT and ET programs have met with the workforce navigator, and students have expressed particular appreciation of the one-on-one support in areas such as resume development and interviewing skills.

[The work force navigator] is great at helping us with career skills... resumes, interviews... it's a major benefit.
– TCI Student

A key component of developing job pathways is ensuring that TCI programs meet WIA, GI Bill, and industry standards as appropriate, so that students can receive the assistance they need to progress in alignment with industry needs. The MT and ET programs are both approved by WIA

and the GI Bill. TCI has also been working on getting FAFSA and Pell grant approval, and has continued to pursue other grant opportunities to help lower course costs for students. In Year 4, TCI was awarded a DOL-funded America's Promise Grant, which will allow all TAACCCT grant-funded programs to be offered tuition free for the next four years.

San Diego has a wealth of growth industries in which program graduates can work, including aerospace, blue-tech, bio-medical, bio-tech, pharmaceutical, and food industries. This is particularly true along North County's "78 Corridor," where a concentrated cluster of tech firms

Job shadowing gave me a sense of what working in the industry is like, and I was like, I can do this!
– TCI Student

provide more than 24,000 high-wage jobs, of which nearly 70% are in manufacturing (San Diego Regional Economic Development Corporation, 2017). The workforce navigator has worked closely with local businesses in these industries to establish job-shadowing opportunities for students enrolled in TCI programs. HME, TE Connectivity, SMAC, Rockwell Collins, and ViaSat provide job shadowing for the ET students. 94% of students in the MT program have taken part in job shadowing. These opportunities have helped students make industry connections and build confidence, and have led in a number of cases to employment upon program completion.

TCI has worked diligently to establish apprenticeship programs, and was able to partner with Able-Disabled to leverage their DOL grant to do so. A Machinist Operator I apprenticeship program was rolled out in Year 4, and four more apprenticeship programs have been approved for CNC Operator, Advanced Manufacturing Leadership, Electronics Assembly, and Electronics Engineering Technician. TCI has also worked closely with the San Diego Maritime Alliance to establish three permanent internship opportunities per cohort for work within Blue Tech companies.

TCI has also fostered a local manufacturing community by hosting class reunions, which not only support past students by providing networking opportunities as they continue on their path in the workforce, but may also aid in recruitment, as these program graduates can serve as role models for new students considering enrollment. The reunions also provide a forum for gathering statistics and qualitative data to contribute to tracking of students who have completed TCI programs.

TCI has been successful in placing students through partnerships with such prominent local employers as Qualcomm, as well as many others. They have begun receiving calls directly from employers with vacancies, and the number of calls has been increasing, to more than 20 calls in the last quarter of Year 3. Industry partners who required two years of experience for hiring new recruits are now accepting students directly from TCI without work

86%
Employment
of Program Graduates

My undergraduate degree gave me an education, but TCI gave me a career.
– TCI Student

experience. 86% of program graduates are employed upon completion. As TCI continues to grow and offer more job shadowing opportunities, internships, and apprenticeship programs, they expect to expand placement relationships with employers. In addition to

efforts to place program graduates directly with employers, TCI developed a Staffing Agency Job Fair in Year 3, with representatives from Colt, Aerotek, and Manpower attending. The Job Fair provided students additional interviewing experience as well as the opportunity to explore other placement options. Students had often not considered staffing agencies and were focusing their efforts solely on industry employers. TCI intends to continue these Staffing Agency Job Fairs as a best practice.

TCI has been seeking employer feedback from Year 1, when a meeting with 20 NTMA members to discuss the progress of MT graduates in their new work sites confirmed that the program was meeting the needs and expectations of local industry. Employers have continued to give positive feedback about the students they have hired out of TCI programs.

Assessments

TCI has developed and delivered orientations for incoming program cohorts, and has implemented a process of student assessment that helps ensure students develop the basic skills necessary for program success. WorkKeys assessments are used to measure "real world" skills such as work discipline, teamwork, customer service, and managerial potential, and the Comprehensive Adult Student Assessment System (CASAS) is used to evaluate reading comprehension, mathematics and writing skills, critical thinking skills, and basic communication skills. Students with low scores on initial assessments can be directed into remedial courses or offered tutoring, which has aided their successful completion of the program.

Basic skills course work was designed to serve students in need of remediation. The provision of remediation and tutoring advanced significantly with the procurement of a grant from the United Way during Year 1, allowing for the development and implementation of remedial math and reading programs. Three out of four low-scoring program candidates completed the first run of this remediation program and were subsequently admitted into the MT program. Sierra College provided a remedial shop math curriculum, and a math tutor was hired to provide support for students in both the MT and ET programs who do not test at the necessary baseline level. In Year 3, 24 students participated in remediation in order to enter the program, and 42 participated in a need-driven homework lab designed to assist students in developing basic skills. These forms of support have not only helped students to succeed by increasing the effectiveness of core training, but have also helped to increase program enrollment.

Regular assessments during the program have helped instructors to focus on areas where students need more help, and final exams assure students and instructors of program effectiveness. Course evaluation has also been conducted through instructor assessment and the input of outside educators and industry professionals. Student questionnaires were developed and deployed to gauge participant experience with course offerings. Additional curriculum has been purchased or developed as necessary in responses to these inputs. By Year 3, TCI had developed a consistent system of course correction that incorporates student evaluations mid- and post-course, instructor debriefings after each cohort, and ongoing classroom monitoring. This system has worked well to revise and resolve program curricula.

My students are testing out in industry at the same levels or higher than students taking a program for two years.
– TCI Instructor

The evaluator, grant coordinator, and workforce navigator worked together on designing surveys that are given to MT and ET students before and after the program to assess their expectations and experiences. Feedback has been overwhelmingly positive, while critically productive comments have informed curricular design moving forward. TCI also began implementing student questionnaires given mid-program to obtain feedback for course improvement in process. This helps the instructor know if they are covering each area adequately, and if they should work more on skills in areas where students are struggling.

TCI administrators meet with instructors regularly to assess course performance. The evaluator has also conducted multiple interviews with the instructors to solicit feedback on program successes and shortcomings. This feedback loop has been particularly useful in the progressive

I knew right away I had to get them in the shop to keep them engaged.
– Machinist Instructor

development of coursework for both the Machinist and ET program. For example, both the Machinist and ET instructors identified the need to maximize student time in the shop or in the lab, where hands-on learning both solidifies classroom study and maintains

student engagement, and they have worked to increase the percentage of program time spent in these spaces.

The Apricot Data Management System was used for gathering and reporting data, following problems and delays in implementing the Orbund Educational Management System. Staff were trained on Apricot, and the system was rolled-out by the beginning of Year 2. Apricot has proven to be an invaluable tool for collecting and analyzing data pertaining not only to student performance and outcomes but also to industry partnerships.

The workforce navigator has continued contact with employers to assess student performance in the workplace following program completion. Overall, employers have been highly satisfied with the quality of workers who have been through TCI programs.

Partner Contributions

The cultivation of working partnerships has been crucial to the success of TCI. An advisory board of industry partners was established in Year 1, and advisory meetings regarding the MT and ET programs were held regularly over the first three years. These meetings provided valuable feedback as these programs were developing. Ongoing input from workforce development agencies, veterans service organizations, and local employers has significantly shaped program and curriculum development around service and industry needs, while additional advisories with representatives of these agencies, organizations, industries, and also local high schools have been useful in structuring pathways into and through the programs TCI offers.

Industry partners provided feedback to TCI recommending development of shorter certification courses that allow an individual to learn a specific topic in manufacturing. The subsequent

creation of these courses for incumbent workers was also in response to the declining unemployment rate during the program period. By Year 3, TCI had added more than 20 courses and five mini-certificate programs, which when stacked can lead toward a more comprehensive certification. The addition of these mini-certificates has not only allowed TCI to offer additional pathways to national certifications but has also significantly increased enrollments.

Partnerships with social service organizations were established beginning in Year 1. TAA representatives visited the campus prior to the opening of the new facility to meet the instructor and interview students in the machinist program, and formal and informal meetings were held with various veterans service providers, the local career center, and WIB. These meetings continued through Years 2 and 3, and have proven to be valuable pipelines for student recruitment.

Although TAA was initially unable to find appropriate clients to send to TCI programs, in Year 3 a few TAA-funded applicants began pursuing training at TCI, and more are expected in the future. Other service organizations have also been helpful in improving outreach and recruitment. In Year 3, two part time WIB representatives joined TCI, and a grant partnership was established with Interfaith Services to increase student enrollments. The career center and WIB have assisted with industry studies and in extending training outreach to

This program allows additional options for veterans who many times do not adapt well to a more traditional community college environment at a cost they can afford.

– Veterans service agency representative

unemployed individuals. Meetings with veterans service organizations and local high schools have also been helpful in identifying potential students who could benefit from TCI programs. TCI also worked with the local CalJOBS site director in exploring the use of Workforce Innovation and Opportunity Act (WIOA) funding to cover student costs, and partnered with Able-Disabled to leverage their DOL grant in developing apprenticeships, an incentive that has helped drive recruitment.

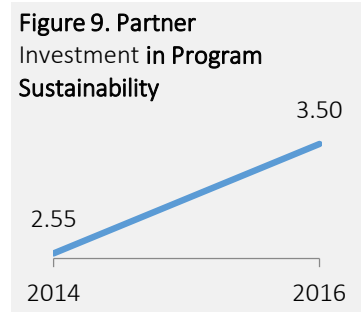
Establishing lasting partnerships with employers in particular is a common challenge for workforce development programs (Spaulding, 2015); however, TCI has demonstrated substantial success at this endeavor, with over 40 employers who have participated by offering tours of their facilities, contributing to graduations, offering job shadowing and internship opportunities, being

guest speakers, developing and teaching classes, and donating tools, equipment, and supplies.

Grants and donations from other community partners have been leveraged to help equip the facility, develop programs, and attract and retain students. These include a \$131,000 grant from USC to develop and offer a low cost welding program, \$39,000 from the San Diego Women's Foundation for welding equipment, \$92,000 from Interfaith Services to assist young adults in completing certificate work skills programs offered at TCI, a \$35,000 grant from the HAAS Foundation for student scholarships, \$56,000 in scholarships from the Girard Foundation for students to attend TCI, and over \$160,000 worth of donated tools and metal from local industry. TCI is also working with Able-Disabled as a training partner for their DOL-funded apprenticeship grant.

Over
\$500,000
in Partner Contributions

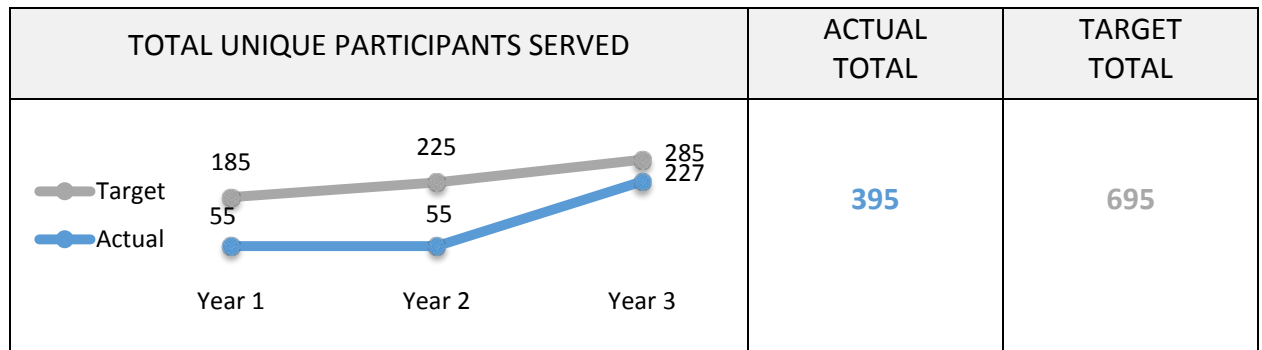
These partnerships will continue to contribute to the ongoing sustainability of TCI. In an annual survey, partner organizations have been asked about their investment in program sustainability. Their responses were weighted as follows: 'Very much invested' = 4, 'Somewhat invested' = 3, 'Plan on investing more in the future' = 2, and 'Not invested at this time' = 1. As Figure 9 reveals, the average of weighted responses shows a significant increase (37%) in partner investment in sustainability from Year 1 to Year 3. More about partner investment and commitment to TCI can be found in the discussion of systems change in the impact assessment below.



IMPACT ASSESSMENT

The successful development of TCI and the implementation of its Career and Technical Education (CTE) programs has had significant impact on participant outcomes and also on MCC and the community it serves. Although enrollments fell short of target numbers, TCI has worked hard to expand recruitment through outreach and marketing efforts, partnerships with workforce and community organizations, and the provision of orientations, assessments, and career planning. Low early enrollments were also due to the high bar set by the intake assessment process, which excluded the majority of applicants to ensure the success of those accepted. Expanded remediation efforts helped increase program intake. These efforts have paid off, as evidenced by the substantial increase in participant numbers in Year 3 after remaining stagnant in Year 2. See Figure 11.

Figure 11. Participants Served



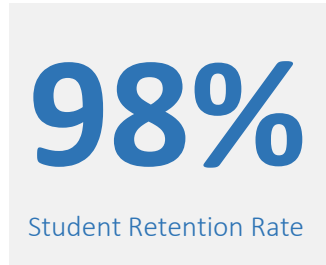
Increasing program enrollments and increasing involvement and investment of academic, industry, workforce, and community partners that comprise the broad system in which CTE takes place in San Diego County will have lasting impact that will support program sustainability. The impact analysis focused on three key areas of impact: education, employment, and systems change. The research questions specific to each area are as follows:

- 1) What is the impact of TCI programs on participant rates of retention, development of skills, and attainment of credentials?
- 2) What is the impact of TCI programs on post-program employment and wages of participants?
- 3) What is the impact of TCI on the policies, processes, and relationships of industries, institutions, organizations, and other key stakeholders invested or involved in career and

technical education and training in San Diego County?

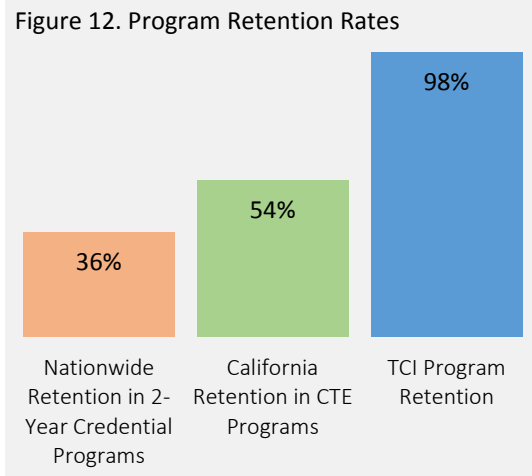
Education Outcomes

Program Retention. Accelerated learning and comprehensive support services have helped



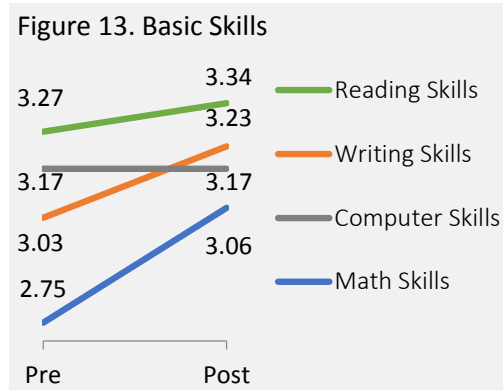
ensure high rates of participant retention in TCI programs. Almost one third of all program participants cited the availability of fast-track career and technical training as a motivating force in program participation at TCI. Remediation efforts have supported the continued participation of

incoming students who score low on basic skills assessments, and have also had an impact on attendance and punctuality, which in turn promotes retention. Engaging students in planning their career path with the workforce navigator has also helped retention, as have the provision of job shadowing, internship, and apprenticeship opportunities. These strategies have proven highly effective, with 98% of



participants completing TCI programs as of the end of Year 3. This is in stark contrast to both the 36% retention rate for students in 2-year credential programs at public institutions nationwide (Shapiro, 2015) and the 54% retention rate of students in CTE programs at community college statewide in California (Student Success Scorecard, 2013). See Figure 12.

Skill Development. TCI has been successful in helping program participants develop skills needed



by local industries. This can be seen in student assessments of basic skills, communication and teamwork, and workplace presence, which produced data reflecting changes in student self-confidence in skills necessary for success in the fields of work for which they are training. Students were asked both pre- and post-program to rate their math, reading, writing, and computer skills. Their responses were weighted as follows: 'Great' = 4, 'Good' = 3, 'Okay' = 2,

and computer skills. Their responses were weighted as follows: 'Great' = 4, 'Good' = 3, 'Okay' = 2,

and 'Needs Improvement' = 1. Weighted responses were averaged, and a paired sample t-test was run to confirm significance. As can be seen in Figure 13, there were significant increases in all but computer skills: a 2% improvement in reading skills, 7% in writing skills, and 11% in math skills. See Table 2 for t-test statistics.

Table 2. Paired Samples Test for MT Skills Assessment

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
MT Skills Pre - MT Skills Post	-.195	1.178	.073	-.339	-.052	-2.679	260	.008

Both MT and ET students were asked both pre- and post-program to what extent they agreed with a number of statements about their communication, teamwork, and workplace presence. Their responses were weighted as follows: 'Agree' = 4, 'Somewhat Agree' = 3, 'Somewhat Disagree' = 2, and 'Disagree' = 1. Weighted responses were averaged and paired sample t-tests were run to confirm significance. Changes can be seen in Figures 14-17. Table 3 shows t-test statistics.

Table 3. Paired Samples Test of MT and ET Skills Assessments

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
MT Pre - MT Post	-.095	.865	.029	-.151	-.039	-3.328	913	.001
ET Pre - ET Post	-.087	.969	.046	-.178	.003	-1.906	445	.057

Figure 14. MT Communication & Teamwork

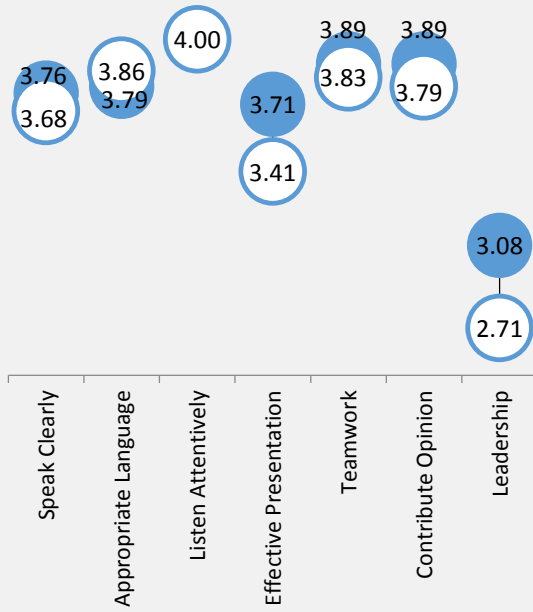


Figure 15. MT Workplace Presence

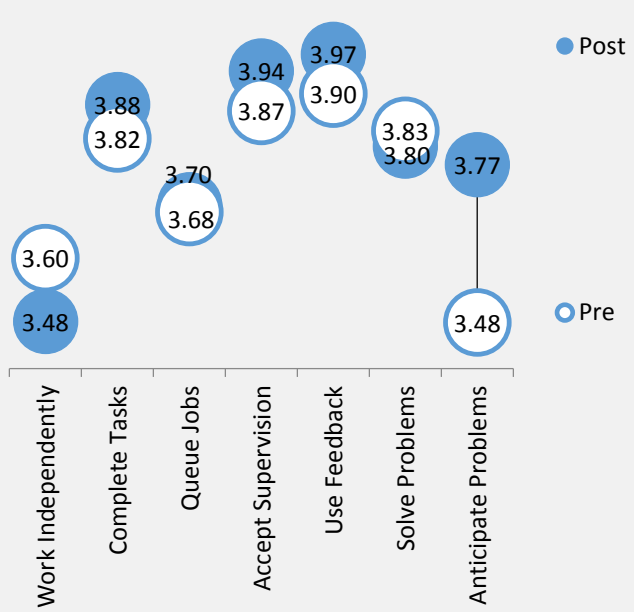


Figure 16. ET Communication & Teamwork

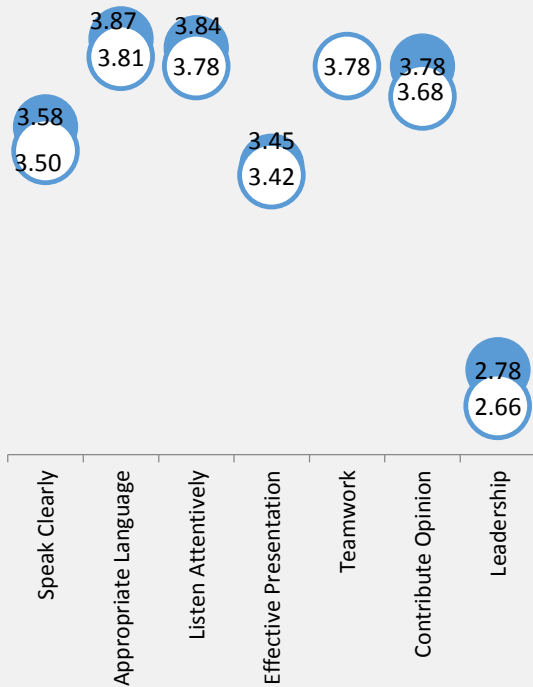
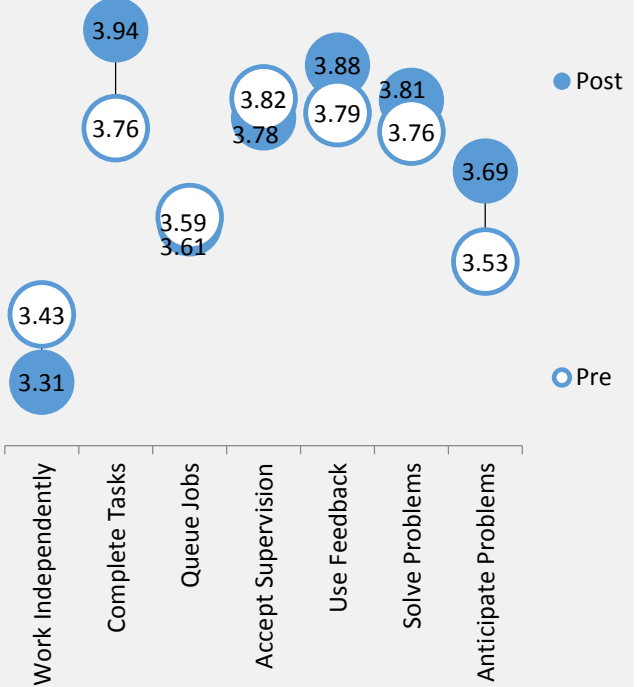
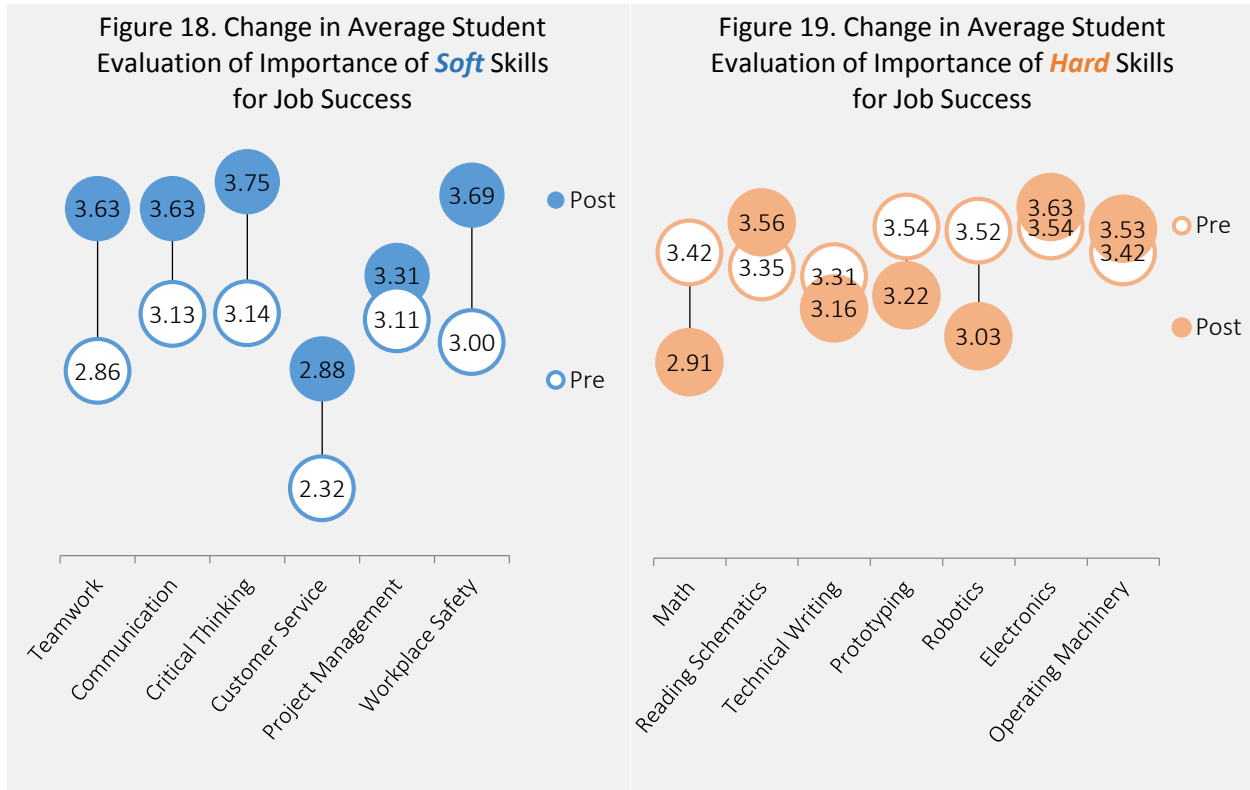


Figure 17. ET Workplace Presence



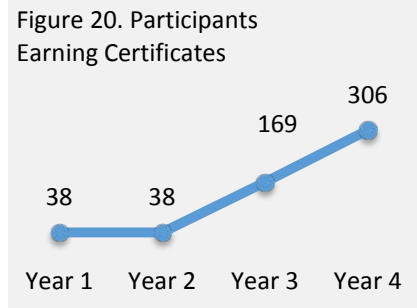
With few exceptions, increases are revealed across the data points of these rubrics, from as little as 1% change in perceived ability to queue jobs to an 13% change in perceived leadership skills.

The most notable exception common to both MT and ET students is the decrease in their perceived ability to work independently, which is likely due to an increase in their perception of the value of teamwork. This is part of a broad shift in students' post-program reevaluation of 'soft skills' such as teamwork and communication in relation to 'hard skills' such as math and prototyping. See Figures 18 & 19, below, and also Figures 3 & 4, in the context of the implementation analysis above.



Credential Attainment. Credentialing and articulation with local industry, academic institutions, and service agencies has been one of the more challenging parts of the project. Some national certifications are now offered for program components where it is feasible and a necessary step along the career pathway in that area. AWO certification is offered in welding, and IPC-A-610 certification in electronics assembly. NCRC certification has been added to both the MT and ET programs, and RF certification was also added to the ET program. The scope and intensity of the MT and ET programs, however, does not align well with the credentialing processes of such organizations as NIMS and SME. However, as these programs have become the Gold Standard for training in this region, and as local employers are hiring students without these certifications

directly out of these programs, it seems that existing program credentials and certificates being offered may be enough. Figure 20 shows the total number of certificates attained by students in Years 1 through 4, based on data collected by TCI. This data reveals a 92% increase in the annual number of TCI program participants earning certifications over the course of the four-year grant period, with a 78% increase in Year 3 and a 64% increase in Year 4, after remaining stagnant in Year 2. By the end of the grant period, 50% of all participants had earned certificates.



TCI has met with local community colleges and state universities to explore articulation and transfer agreements that would allow students to earn college credits for work experience after completing TCI programs, to earn stackable credits in pursuit of advance standing, and to lattice their careers by earning professional development certifications. Although no such agreements have been established as of the end of the grant period, working with these institutions, local employers, and TAA and industry representatives has helped ensure that TCI programs and curriculum align with the relevant programs at these colleges and universities in anticipation of articulation, while also offering viable career pathways to an increasing number of students.

Employment Outcomes

The quality of training provided in TCI programs is evidenced in the hirability of program participants and their retention as employees. Student data collected by TCI for mandated outcome reporting shows that through Year 3, 119 students had been hired upon program completion, and 110 of these (92%) had been retained at follow-up. See Figures 21 & 22. Moreover, a significant number of incumbent employees who have received training at TCI have received a wage increase post-enrollment. See Figure 23. More mandated annual outcome data can be found in Appendix E.

Figure 21. Student Employment On Program Completion.

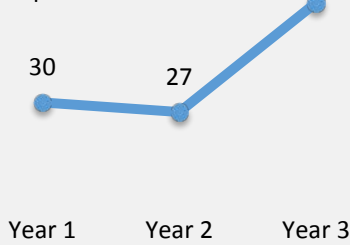


Figure 22. Employment Retention on Follow-Up.

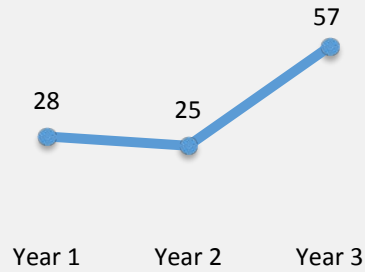
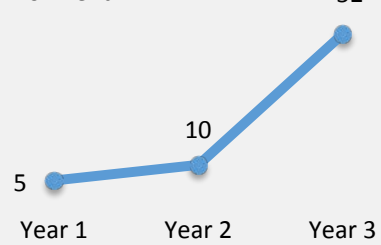
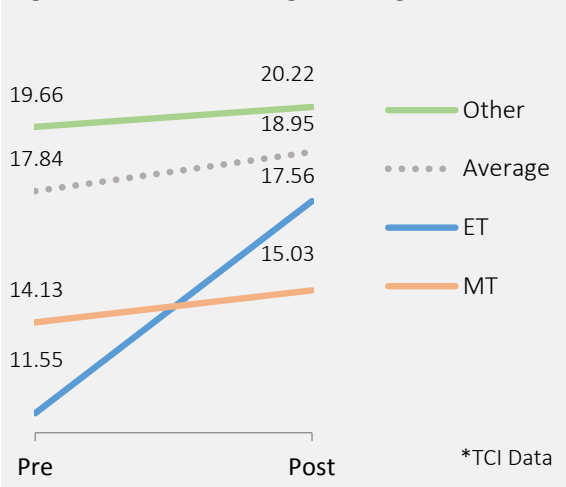


Figure 23. Incumbent Worker Wage Increases Post-Enrollment.



Analysis of this same data conducted in Year 4 found that 86% of participants were employed upon program completion. Of those employed, 92% of ET graduates, 93% of MT graduates, and

Figure 24. Pre/Post Program Wages*



78% of graduates from other TCI programs were working in fields related to their programs of study. Paired t-tests of wage data reported pre- and post-program dosage revealed a 6% average increase (\$1.11/hour) in graduate wages. More specifically, ET graduates averaged a 52% increase in wages, from \$11.55/hour to \$17.56/hour; MT graduates averaged a 6% increase in wages, from \$14.13/hour to \$15.03/hour; and graduates of other programs averaged a 3% increase in wages,

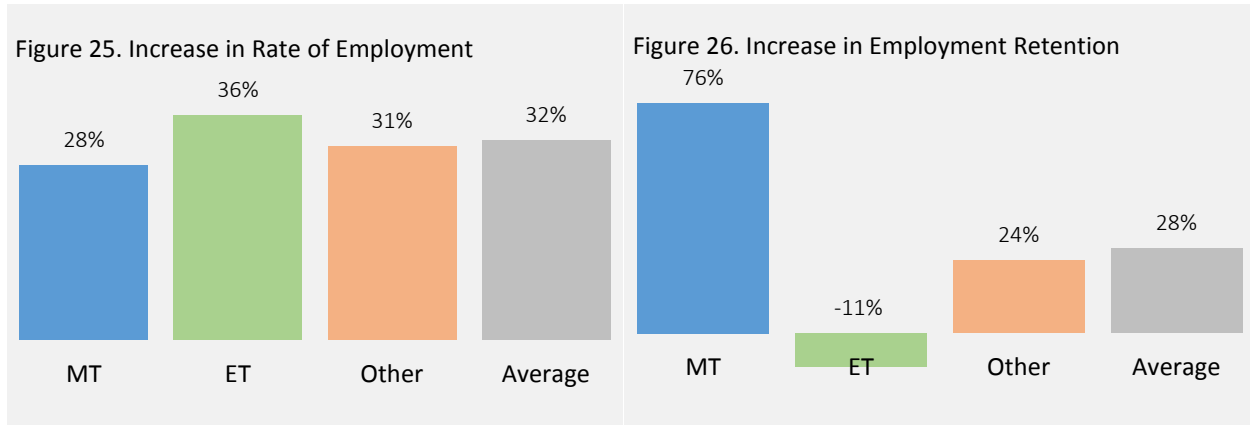
from \$19.66/hour to \$20.22/hour. See Figure 24, and Table 4 for t-test statistics.

Table 4. Paired Samples Test for Pre-Post Program Wages, TCI Data

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Pre Program Wage - Post Program Wage	-1.10932	5.21646	.43172	-1.96259	-.25604	-2.570	145	.011

Analysis of aggregated data gathered on program participants by the Department of Labor and the California Employment Development Department also reveals significant improvements in employment, retention, and wages. Over the course of the grant period, the overall employment rate of all program participants increased by 32%, with a 28% increase for MT graduates, a 36%

increase for ET graduates, and a 31% increase for graduates of other programs. See Figure 25. Job retention was also calculated. For each cohort, if an individual worked in the first quarter of a year and also worked in the subsequent four quarters then they were counted as retained. Job retention increased by 28% over the course of the grant period, with a 76% increase for MT graduates, an 11% decrease for ET graduates, and a 24% increase for graduates of other programs. See Figure 26.



Overall, DOL wage data tracks with self-reported student data gathered by TCI, although with slightly different distributions. DOL wage data was aggregated for all program participants, adjusted to the Department of Finance Consumer Price Index for 2017 dollars, reported quarterly, and then translated into hourly wages. Independent samples t-tests of this data pre- and post-program dosage revealed a 7% average increase (\$1.10/hour) in graduate wages. ET graduates averaged a 9% increase in wages, from \$11.92/hour to \$13.03/hour; MT graduates averaged a 13% increase in wages, from \$13.24/hour to \$15.00/hour; and graduates of other programs averaged a 2% increase in wages, from \$24.98/hour to \$25.40/hour. See Figure 27, and Table 5 for t-test statistics.

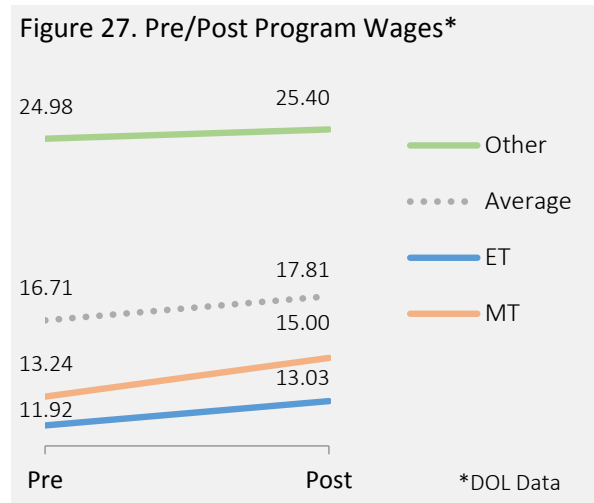
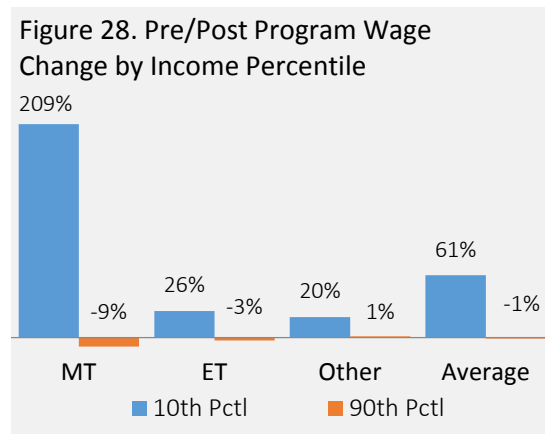


Table 5. Independent Samples Test for Pre-Post Program Wages, DOL Data

	Unpaired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Pre Program Wage - Post Program Wage	-1205.0	7142.5	539.598	-2265.14	-144.86	2.2332	703	.026

Moreover, the greatest increase in wages was realized by those program participants in lower income brackets, while those in higher brackets saw marginal gains or even a decrease in wages post-program. The average wage increase for all TCI program graduates in the 10th income percentile was 61% as compared to a 1% decrease for those in the 90th income percentile. More specifically: MT graduates in the 10th percentile averaged an increase of 209% in post-program



wages, whereas those in the 90th percentile saw a 9% decrease; ET graduates in the 10th percentile realized an increase of 26% in post-program wages, while those in the 90th percentile saw a 3% decrease; graduates of other programs in the 10th percentile realized a 20% increase in post-program wages, and those in the 90th percentile saw only a 1% increase. See Figure 28. While this is likely due in

part to the relative wage mobility of different income brackets, where those in low brackets have a lot of room for wage growth and those in high brackets are approaching pay caps for their field, it also suggests that TCI programs best serve those with the most need for developing skills that open the door to higher wage employment.

Systems Change

TCI has established strong partnerships within the education, industry, and public sectors. These partnerships have been leveraged in developing a state-of-the-art facility and implementing programs that benefit not only participants in TCI programs, but also MCC, local industry, and the broader community. The collaborative efforts of these partnerships have had a collective impact on the policy, process, and relationships scaffolding the delivery of Career and Technical Education (CTE) in San Diego County. This collective impact on the local system of CTE will help

support the long-term sustainability of TCI, extending the benefits it provides to participants, MCC, and the broader community well into the future.

TCI has created a culture change at both MCC and the North San Diego area. With the increase in the number of courses and programs offered at TCI, the value of accelerated work skills to our local industries has increased. Where there was general good will about the creation of TCI, there is now a much more profound appreciation for the types of programming offered at TCI. The affluent residents of Carlsbad, where TCI is located, and our own college faculty have begun to see the tremendous value in offering an alternative pathway for a significant number of local residents.

– MCC Director of Community Education & Workforce Development

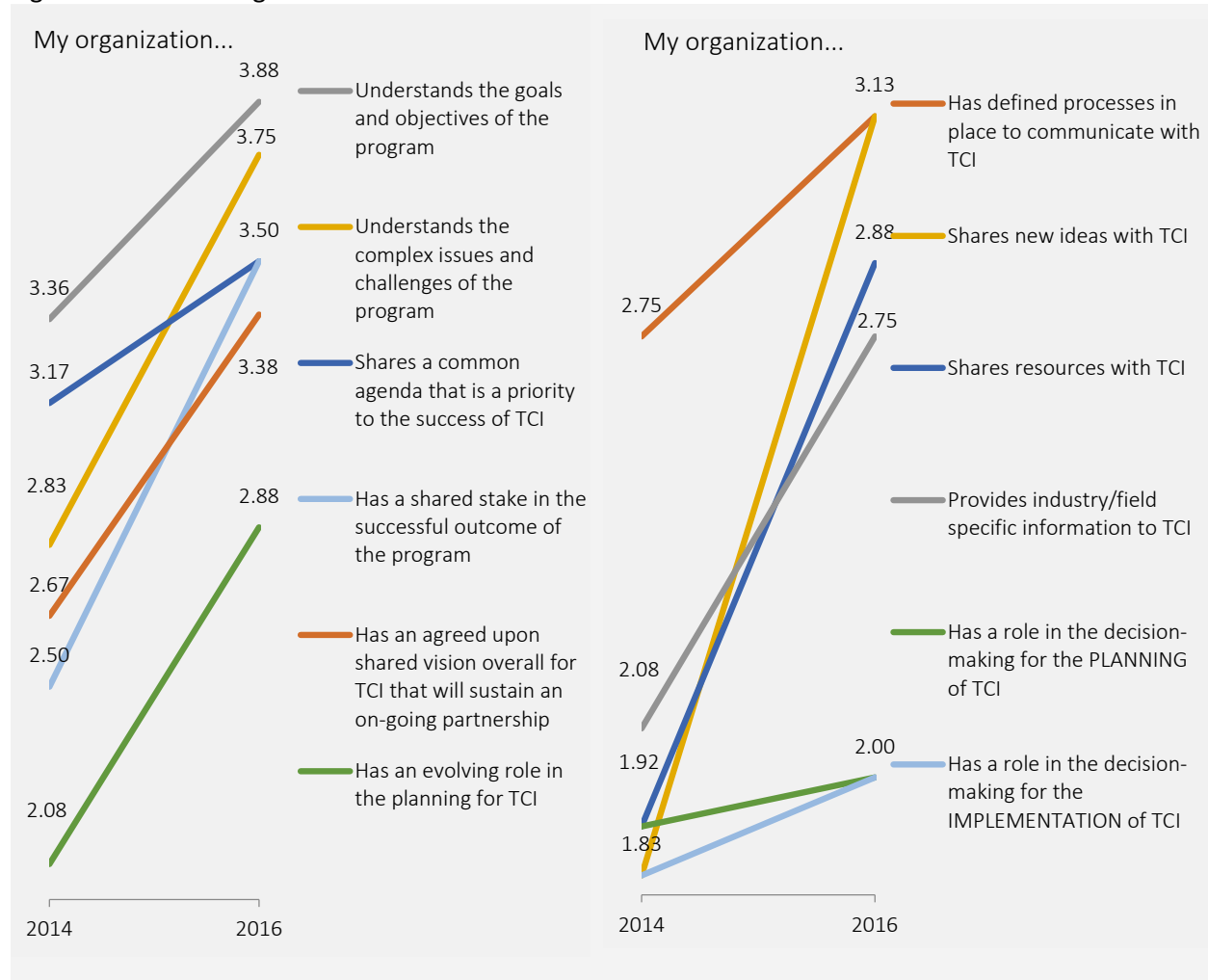
Relationships. The strength of partnerships that TCI has established with local industries has had a positive impact on their alignment with the vision, agenda, goals, objectives, planning, and outcomes of TCI programs, and also on their investment in communication, planning, decision-making, and sharing of ideas, information, and resources with TCI. Partner organizations were asked a number of questions structured within two different rubrics created to assess the actual status of their alignment with and investment in TCI. Their responses were weighted as follows: 'It has been accomplished' = 4, 'In progress' = 3, 'On occasion' = 2, and 'Not at this time' = 1. Paired t-tests were conducted on weighted responses from Year 1 and Year 3 to validate significance; the statistical results can be seen in Table 6.

Table 6. Paired Samples Test of Partner Alignment and Investment in TCI

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
A Y1 - A Y3	-.551	1.529	.184	-.918	-.183	-2.991	68	.004
I Y1 - I Y3	-.712	1.661	.216	-1.145	-.279	-3.291	58	.002

The average of weighted responses reveals a significant increase in alignment and investment across all measures from Year 1 to Year 3. See Figure 28. On average, there was a 26% increase in measures of alignment and a 29% increase in measure of investment, although it should be noted that the least substantial change was in the two measures of investment in decision-making, which together only average a 7% increase. These increases in partner alignment with and investment in TCI signal a commitment to its continued success and sustainability.

Figure 28. Partner Alignment with and Investment in TCI



Process. The strong partnerships forged between TCI and local industries have reshaped the process through which CTE is delivered in San Diego County. While TCI programs have been informed by industry input from the beginning – as exemplified above in the case of increased program emphasis on soft skills in response to advisory board feedback – industry partners have become directly involved in the process of developing and delivering new programs, courses, and curriculum. Such collaborative efforts include the development of an electronic assembly class in

Systems Change Case Study Brief
ViaSat is a global broadband technology company headquartered in Carlsbad, with 3,700 employees in 22 locations worldwide. They initially partnered with TCI as a donor of capital equipment. But as a mature company, ViaSat had been dealing with the growing challenge of an aging yet experienced workforce, and as their relationship with TCI evolved, they began discussing how TCI could better meet their workforce needs. These discussions resulted in the collaborative development and implementation of classes in electronic assembly. Senior ViaSat staff became instructors at TCI, and students benefited from their real life work experience.

partnership with ViaSat, which is taught by two ViaSat supervisors. Another electronic assembly class was created in partnership with HME, and a lean manufacturing program is being developed in partnership with C&H. This change in the collaborative process, in which industry partners shift from functioning in an advisory capacity to taking a direct participatory role, signals a tighter integration between industry and CTE, that will allow the programs TCI offers to be more responsive to the changing needs of local employers.

Policy. The successful implementation of TCI was leveraged by MCC to promote a college bond measure approved by local residents that will generate \$455 million for upgrading instructional technologies – the first time in more than 50 years that such a measure was passed. Business groups and the San Diego County Taxpayers Association were among those backing the measure, which will fund the construction of career training facilities for science, nursing, health care, engineering, and skilled trades; improve job training, counseling, and support services for veterans; and modernize instructional technology in math, science, and technology. Money generated by this bond measure will not only help sustain TCI, but will also have long-ranging benefits for CTE in general in San Diego County.

CONCLUSIONS

MiraCosta College successfully established TCI as a dedicated career and technical training institute offering certificate programs and classes that provide workers with the skills and credentials needed to attain jobs in demand by manufacturing and technology industries in San Diego County. Participants in these programs have improved rates of employment and job retention, as well as increased wages.

In the process of implementing these programs, TCI has collaborated with industry, workforce, and community partners, who have together had a positive impact on policy, processes, and relationships scaffolding the delivery of Career and Technical Education (CTE) in San Diego County. These changes to the local system of CTE will help support the long-term sustainability of TCI, extending the benefits it provides to workers and industries well into the future.

In assessing the implementation of TCI and its impact on participant outcomes and systems change, the evaluation team documented several key lessons relevant to the sustainability of TCI specifically and to CTE programs in general, and also identified implications for future workforce and education research.

Lessons Learned

Industry partnerships supported TCI in sometimes unexpected and unconventional ways. While program development was informed by industry needs from the beginning, being open and flexible enough for ongoing realignment with local employers allowed TCI to capitalize on their changing needs rather than set back by them. By not adhering tightly to initial assessment of industry demands, TCI was able to be agile in program implementation, engaging in ongoing dialogue, responding to advisory input, and enabling participation of industry partners. Both program participants and industry benefitted as TCI classes and programs adapted to the changing needs of local employers for skilled workers. **Looking for and leaning into alternative forms of industry support expands opportunities for program development**

The provision of support services was invaluable to the success of both TCI and its program participants, and the key to this success was not only the breadth of these services, but also the versatility of the providers. In particular, TCI's grant-funded workforce navigator took on many

unanticipated roles that helped guide students from the point of initial contact to getting a job in their field of study. These included not only the provision of intake interviews, orientations, and career counseling, but also the function of industry liaison, channeling feedback into the development of supportive program components like assessments and remediation, and securing opportunities for job shadowing, internships, and employment. **Comprehensive and versatile support services are crucial for participant intake, retention, and employment upon program completion.**

The collective impact of strong partnerships on local policy, processes, and relationships at play in career and technical training in San Diego County helped open space for the implementation of TCI by creating and supporting demand for its programs. Collaborative efforts between academic, government, industry, workforce, and community partners had a positive impact on the established system of CTE provision in San Diego County. Partner alignment through a common agenda, continuous communication, shared data, and mutually reinforcing activities promoted this collective impact, and the resultant changes to the system enabled the success and sustainability of TCI. **Systems change is necessary to embed new programs and to sustain them over time.**

Close alignment between TCI programs and the needs of local workforce groups was never fully realized. Although TCI worked diligently to solicit input from local TAA, WIB, and Veterans group representatives, very few eligible applicants were channeled into TCI programs by these organizations. The evaluation team was unable to determine why, but possible reasons include 1) decreasing unemployment over the course of the grant period, and 2) lack of interest or follow through on the part of those directed to TCI by these organizations. Both of these reasons suggest the need for better alignment with these groups. **CTE programs need to align and integrate with local workforce groups.**

Implications for Future Research

First, access to administrative records and sharing of data needs improvement. Especially in California and other states where disaggregated Department of Labor is not available, similar programs need to develop worklike partnerships that facilitate data sharing. Disidentification of individualized data would allow for the ethical creation and population of a public database

useful for workforce and education research and invaluable for evaluation of career and technical training programs.

Second, case studies of programs implementing selected strategies and best practice should be considered as a viable and valuable research method. The rigorous research design standards imposed by the Department of Labor suggest that there is nothing to be learned outside of randomized control trials or comparison group studies, which devalues important lessons from the field. Smaller, more agile studies developed through prototyping would better reflect on-the-ground changes during program implementation, and would afford the responsive adaptation necessary for successful program start-up.

Third, better alignment between program implementation and evaluation is needed. This could be facilitated by conducting orientations with all grantees during their first federal meeting to promote and reward closer relationships between program staff and evaluators, and by advocating their attendance at annual meetings to build relationships and dialogue. This is particularly necessary for new programs in which time and attention is focused on program startup. Encouraging the use of cost benefit analysis, evidence briefs, and white sheets would also help by making measures of program implementation and impact more accessible to all stakeholders. Such alignment would yield better research design, data collection, and reporting.

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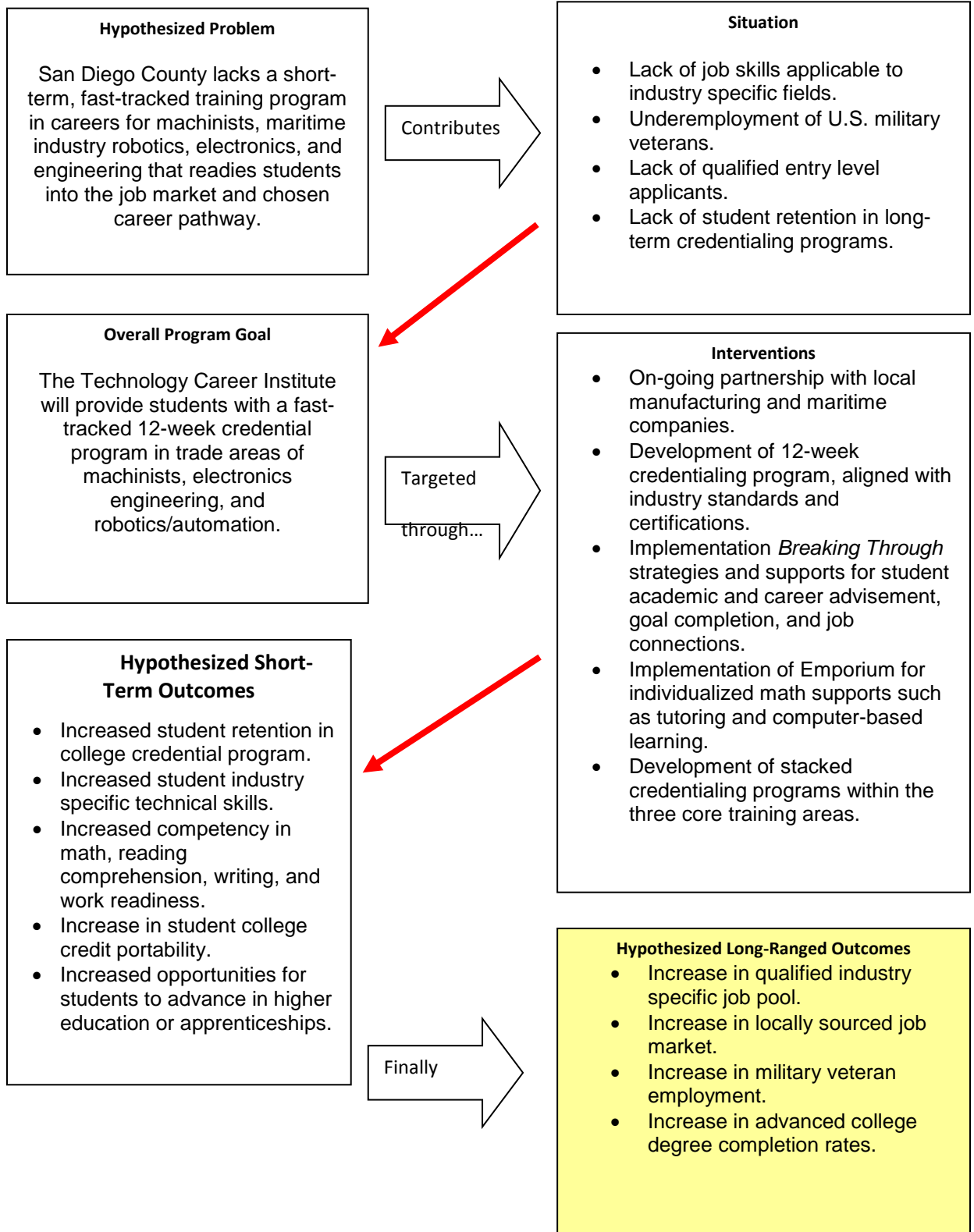
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APPENDIX A: LOGIC MODEL



APPENDIX B. EVALUATION PLAN

Evaluation Questions/ Components	Data Collection Components	Instrumentation	Methodology	Timeline	Data Use
<p>Program</p> <p>How was the original vision of TCI developed?</p> <p>How did the capacity of program change through the grant program?</p>	<p>Curriculum selection</p> <p>Recruitment</p> <p>Partnerships</p> <p>Latticed/ stacked coursework pathways.</p> <p>Increased student capacity/ learning opportunity.</p> <p>Track student capacity</p>	<p>Checklist and interview questions.</p> <p>Tracking planning meetings through targeted time studies (LM timeline).</p>	<p>Staff interviews</p> <p>Evaluation observed site visit</p> <p>Key stakeholder interview</p>	<p>Baseline and Annually</p>	<p>Internally for staff and reporting to DOL.</p>
<p>Student</p> <p>What are the characteristics of students?</p> <p>How did students' progress in program?</p> <p>What program components were useful?</p>	<p>Indicators of program self-selection and recruitment</p> <p>Direct service provision.</p>	<p>Participant Surveys</p> <p>Checklist of assessment tools/student support services (Orbund)</p>	<p>Tracking program dosage</p> <p>Analysis of student surveys</p> <p>Student interviews</p> <p>Focus groups</p>	<p>On-going beginning Year 1</p>	<p>Use of data in quarterly meetings and real time feedback of interviews in Year 1</p> <p>Evaluation Briefs and Annual White Sheets</p>

Evaluation Questions/ Components	Data Collection Components	Instrumentation	Methodology	Timeline	Data Use
<p>Partner/System</p> <p>To what extent did program partners add to program, development, recruitment, training, placement program management and program sustainability?</p>	<p>Organizational capacity for collaboration and sustainability</p> <p>Direct service provision and services tracked</p>	<p>Partner Surveys</p> <p>Stakeholder surveys</p> <p>Student tracking (case management database)</p>	<p>Online survey of partners.</p> <p>Meeting attendance and observation for key issues.</p> <p>Web analytics</p> <p>Collective Impact Rubric</p>	<p>Survey delivered annually.</p> <p>Meetings TBS</p>	<p>Feedback to staff</p> <p>Annual reports and quarterly reports as needed</p>

APPENDIX C. YEAR 3 EVALUATION SUMMARY

MiraCosta College TAACCCT Grant Y3 Evaluation Summary
October 2015-September 2016

Technical Career Institute

MCC Technical Career Institute objective is to provide students with personal and job related support services. All students meet a high standard of program attendance, receive services from a Work Force Navigator and participate in job shadowing and industry related field trips.

Year 3 Program Highlights

20 new classes added by MCC and/or certificate programs in response to local industry.

In partnership with a local partner, we began a new Electronic Assembly Certificate.

25 High School Counselors held a breakfast meeting to inform them of our program.

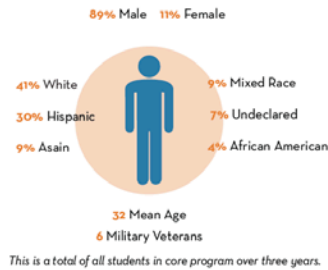
Began a Machinist Operator 1 and CNC Operator Apprenticeship program approved by both the Federal and State Departments of Labor.

4,000 visits to tcimircosta.edu during September 2016.

2 Alumni events conducted to facilitate networking with former students.

\$318,000 in additional funding were garnered to enhance TCI offerings and scholarships.

Certificate Program Student Profile



Year 3 Cumulative Program Results

700 Hours of one-on-one services were conducted by the Work Skills Navigator.

26 Mini Manufacturing programs added

126 Enrollees completed a grant-funded program of study (102 MT, 24 ET).

112 Program graduates employed after program completion (93 MT, 19 ET).

95 Enrollees retained in job at follow-up (26MT, 19 ET).

15 Enrollees who were employed received a raise upon program completion.

Importance of Skills for Job Success
Engineering Tech Students N=40



Importance of Skills for Job Success
Machinist Tech Students N=70



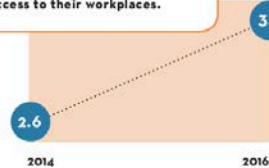
MiraCosta College TAACCCT Grant Y3 Evaluation Summary



Continued Partnership with Industry Increases Technical Career Institute Success



Industry Partners help to ensure the program's future by providing valued input, materials and access to their workplaces.



Mean scale scores in measure of partner commitment over time.

Machinist Tech Student Survey responses
Now that you have graduated can you comment on the course quality?

It was a great course, I learned a lot and the teacher was fantastic.

More on CNC/CAM/Operation/Setup

Great program. I just felt it would've been helpful for future math problems to have the tutor that was said was coming did. Other than that I was happy with the outcome.

I was very satisfied with the outcome.

The course was fantastic and fast paced as promised. The instructor was exceptional. I appreciate the connections the program has with industry. Everyone in the course was cooperative. Wish I would have had more math, and access to industry measuring tools.

Engineering Tech Student Survey responses
Did this program meet your expectations?

It exceeded my expectations related to job skills in communication, presentations, field technicians, BOM, cGMP, OSHA.

While I would have enjoyed a more thorough examination of some of the course materials, overall the course fulfilled my expectations and helped me to learn new work skills and find gainful employment.

Yes, the program had mechanics, electronics and software in it. The software could have been a little more in depth than what we had.

It provided me with a basic understanding of a wide variety of engineering topics and tools.

This course will give me an edge over other job seekers.

Program funded by the US Department of Labor TAACCCT grant.

APPENDIX D. TCI ACTIVITIES AND DELIVERABLES

ACTIVITIES		STATUS	START / END DATE	DELIVERABLES
1. Program Start Up	1.a Build an infrastructure that supports strong industry connection and input from previous TAACCCT awardees	Complete	10/1/13 – 1/30/14	<ul style="list-style-type: none"> • Workforce Navigator & Lab Tech hired and trained <input type="checkbox"/> • Operations and evaluation processes in place <input type="checkbox"/> • Advisory Board in place <input type="checkbox"/> • Facility in place <input type="checkbox"/> • New registration/retention software ready to use <input type="checkbox"/> • Best practices from TAACCCT awardees and DOL training inform program development <input type="checkbox"/>
	1.b Develop and align curricula to industry needs, using evidence-based models and National Certification standards	Complete	10/1/13 – 6/30/14	<ul style="list-style-type: none"> • Instructors hired for core courses <input type="checkbox"/> • National certification obtained <input type="checkbox"/> • Course content, software, assessments and materials in place <input type="checkbox"/> • Remediation plan in place <input type="checkbox"/> • Best practices from TAACCCT awardees inform program develop <input type="checkbox"/> • Advisory board approves curricula <input type="checkbox"/>
	1.c Coordinate with TAA rep, Veterans rep, and local One Stops to collaborate on identifying potential students, assessment strategies, and service needs	Ongoing	1/1/14 – Ongoing	<ul style="list-style-type: none"> • All support agencies are ready to recruit and assist students <input type="checkbox"/> • Student success and retention strategy is in place <input type="checkbox"/>
	1.d Prepare an inviting state-of-the-art facility conducive to accelerated and blended learning, job readiness, and skills development	Complete	10/1/13 – 6/30/15	<ul style="list-style-type: none"> • Establish classrooms <input type="checkbox"/> • Additional machines installed to enhance / expand current course <input type="checkbox"/> • Online programs obtained for use in blended learning model <input type="checkbox"/>

ACTIVITIES		STATUS	START / END DATE	DELIVERABLES
2. Deliver Instruction	2.a Student recruitment with planned assessment and remediation tools available	Ongoing	3/1/14 - Ongoing	<ul style="list-style-type: none"> Students enroll in the program <input type="checkbox"/> Students have career pathway plans <input type="checkbox"/> New software enrolls, tracks and retains students <input type="checkbox"/>
	2.b Coursework implementation utilizing "Breaking Through" approach through Accelerated Learning, Comprehensive Support Services, Labor Market Payoffs, and Aligning Programs for low-skilled adults	Ongoing	6/1/14 - Ongoing	<ul style="list-style-type: none"> Students enrolled <input type="checkbox"/> Increase expansion modules for continuing education <input type="checkbox"/> Emporium math and remediation support resources in place <input type="checkbox"/> Students access funding for training and support services <input type="checkbox"/> Successful retention strategies <input type="checkbox"/>
3. Articulation and Stackable Credentials	3.a Create course certifications for developing competencies that are recognized by industry	Ongoing	6/1/14 - Ongoing	<ul style="list-style-type: none"> ISA, ETA, & NIMS certification approved or in process <input type="checkbox"/> Students obtain certifications <input type="checkbox"/> TCI is approved "testing" site
	3.b Establish work experience, internship, and job placement services	Ongoing	9/1/14 - Ongoing	<ul style="list-style-type: none"> Students can earn college credit through work experience and internships Students placed in internships <input type="checkbox"/> Job offers & placements for students <input type="checkbox"/>
	3.c Create educational and career pathways for TAA eligible workers, Veterans, and other adults	Complete	4/1/14 - 9/30/15	<ul style="list-style-type: none"> TAA students are provided educational plans, build on experience & best practices <input type="checkbox"/> Student materials available to assist with educational options & career pathways <input type="checkbox"/> More articulation agreements with local community and state colleges <input type="checkbox"/>
4. Evaluation	4.a Course evaluation using data and industry input for continuous improvement	Complete	10/1/13 - 9/30/17	<ul style="list-style-type: none"> Evaluation informed by student and industry input <input type="checkbox"/> Course correction strategy in place <input type="checkbox"/> Evaluation process guides course improvement <input type="checkbox"/>
	4.b Project evaluation	Complete	10/1/13 - 9/30/17	<ul style="list-style-type: none"> Ongoing industry input <input type="checkbox"/> Quarterly data & evaluation report <input type="checkbox"/> Sustainable program <input type="checkbox"/>

APPENDIX E. ANNUAL OUTCOME DATA

#	Outcome Measure	Outcomes by Program: Year 1 to 3	Totals
1	Total Unique Participants Served	<p> ● Machinist/Engineering ● Incumbent </p>	337 116
2	Total Number of Participants Completing a TAACCCT-Funded Program of Study	<p> ● All Participants </p>	245
2a	Total Number of Grant-Funded Program of Study Completers Who Are Incumbent Workers		116
3	Total Number of Participants Still Retained in Their Program of Study or other TAACCCT-Funded Program		90
4	Total Number Retained in Other Education Programs		5
5	Total Number of Credit Hours Completed (aggregate across all enrollees)	TAACCCT is an non-credit program	0

#	Outcome Measure	Outcomes by Program: Year 1 to 3	Totals								
5a	Total Number of Participants Completing Credit Hours	TAACCCT is a non-credit program	0								
6	Total Number of Earned Credentials (aggregate across all enrollees)	<table border="1"> <tr><th>Year</th><th>Value</th></tr> <tr><td>Year 1</td><td>38</td></tr> <tr><td>Year 2</td><td>38</td></tr> <tr><td>Year 3</td><td>169</td></tr> </table>	Year	Value	Year 1	38	Year 2	38	Year 3	169	245
Year	Value										
Year 1	38										
Year 2	38										
Year 3	169										
6a	Total Number of Students Earning Certificates – Less Than One Year	<table border="1"> <tr><th>Year</th><th>Value</th></tr> <tr><td>Year 1</td><td>38</td></tr> <tr><td>Year 2</td><td>38</td></tr> <tr><td>Year 3</td><td>169</td></tr> </table>	Year	Value	Year 1	38	Year 2	38	Year 3	169	245
Year	Value										
Year 1	38										
Year 2	38										
Year 3	169										
7	Total Number Pursuing Further Education After Program of Study Completion	<table border="1"> <tr><th>Year</th><th>Value</th></tr> <tr><td>Year 1</td><td>4</td></tr> <tr><td>Year 2</td><td>6</td></tr> <tr><td>Year 3</td><td>15</td></tr> </table>	Year	Value	Year 1	4	Year 2	6	Year 3	15	25
Year	Value										
Year 1	4										
Year 2	6										
Year 3	15										
8	Total Number Employed After Program of Study Completion	<table border="1"> <tr><th>Year</th><th>Value</th></tr> <tr><td>Year 1</td><td>30</td></tr> <tr><td>Year 2</td><td>27</td></tr> <tr><td>Year 3</td><td>62</td></tr> </table>	Year	Value	Year 1	30	Year 2	27	Year 3	62	119
Year	Value										
Year 1	30										
Year 2	27										
Year 3	62										
9	Total Number Retained in Employment After Program of Study Completion	<table border="1"> <tr><th>Year</th><th>Value</th></tr> <tr><td>Year 1</td><td>28</td></tr> <tr><td>Year 2</td><td>25</td></tr> <tr><td>Year 3</td><td>57</td></tr> </table>	Year	Value	Year 1	28	Year 2	25	Year 3	57	110
Year	Value										
Year 1	28										
Year 2	25										
Year 3	57										
10	Total Number of Participants Employed at Enrollment Who Received a Wage Increase Post-Enrollment	<table border="1"> <tr><th>Year</th><th>Value</th></tr> <tr><td>Year 1</td><td>5</td></tr> <tr><td>Year 2</td><td>10</td></tr> <tr><td>Year 3</td><td>52</td></tr> </table>	Year	Value	Year 1	5	Year 2	10	Year 3	52	67
Year	Value										
Year 1	5										
Year 2	10										
Year 3	52										