



# TAACCCT 3 INTERFACE PROJECT

## Final Evaluation Report

September 2017

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*“INTERFACE is a strategic alignment between colleges, nationally-recognized leaders in education, state-wide educational systems, workforce development systems, current TAACCCT grant recipients, and 39 businesses to strengthen computer skill competency and expand pathways in information technology-related programs to TAA-eligible, Veteran, and other adult learners.”*

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**About this report:** This document is intended to satisfy the requirement stipulated in USDOL-ETA SGA/DFA PY-12-10, 17.282. This final report focuses on evaluation findings and includes a review of the evaluation design, as well as the results of the outcome and impact evaluations. Evaluation findings were meant to provide formative and summative feedback to consortium leadership.

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# TAACCCT3 INTERFACE PROJECT

## Final Evaluation Report

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## INTERFACE Project Executive Summary

### TAACCCT Program/Intervention Description and Activities

The Trade Adjustment Assistance Community College and Career Training (TAACCCT) program exists to help community colleges expand and improve their ability to offer educational programs that can be completed in two years or less and prepare workers for high-wage, high-skill occupations. In 2013, Northcentral Technical College (NTC) was awarded a Round 3 TAACCCT grant to create Intentional Networks Transforming Effective and Rigorous Facilitation of Assessment, Collaboration, and Education (INTERFACE). The remaining 15 Wisconsin Technical College System (WTCS) colleges made up a consortium that worked to strengthen computer skill competency and career pathways in information technology-related programs through strategic alignment between the 16 Wisconsin technical colleges, business partners, current TAACCCT recipients, the workforce development system, and WTCS.

All 16 colleges improved or expanded programs using grant funds in a variety of ways. Almost all colleges created new credentials and curriculum, while focusing on the creation of new and updated career pathways. Colleges updated their curriculum, purchased equipment to better serve students, and/or used grant-funds to hire additional staff (i.e. instructors, student support). Course delivery methods varied across colleges including traditional, online, distance, and hybrid models. Each college tailored their delivery methods based on the needs of their local businesses, student population and the type of program.

Prior Learning Assessment (PLA) improvements were made at most colleges. Examples include streamlining the existing PLA processes, marketing the opportunities more to students through online tools, and creating standardized PLA strategies for veterans, consortium-wide.

Most colleges used grant-funds to provide student support to INTERFACE participants. This included offering preexisting support roles, expanding these roles, or hiring personnel for additional support roles. Student support was provided in five main categories: student outreach, academic advising, non-academic support, academic support, and career-readiness support. The services helped students understand program options, program progress, job interview processes, difficult course content, and other issues that impact school performance.

### *INTERFACE Participant Profile*

At the closing of the grant, 4,962 participants were served, surpassing the projection of 3,058. Of the participants served, 72% were male (n = 3582) and 28% were female (n = 1380) with an average age of 28 years old. Participant ethnicity varied, with 74% being White (n = 3658), 8% Black or African American (n = 408), 6.5% Asian (n = 322), and 5% Hispanic or Latino (n = 251). Fifty-four percent of participants were Full-Time (n = 2670) while 46% were Part-Time (n = 2292). The INTERFACE Project sought to reach the Trade Adjustment Assistance(TAA)-eligible individuals (1%: n = 51), incumbent workers (51%: n = 2539), and veterans (6.5%: n = 320) within Wisconsin.

### **Evaluation Design Summary**

The primary goal of the evaluation was to help the consortium and the United States Department of Labor (USDOL) understand the impacts and outcomes of the INTERFACE Project. Providing summative feedback to facilitate continuous improvement at the colleges was a secondary goal.

This evaluation was grounded in the Utilization-Focused Evaluation (UFE) principles focused on stakeholder use. The evaluation team ensured that all aspects of the evaluation were useful to the consortium lead, individual colleges, and USDOL. Strong, collaborative relationships between the team and project leaders enhanced the collection of data and provided insight on the improvements made at various levels. Overall, the evaluation used

a quasi-experimental, concurrent mixed-methods design. Using qualitative and quantitative data, the evaluation team provided a thorough analysis and informative results.

The implementation evaluation was conducted to determine areas of the intervention that needed improvement. The evaluation design contributed to an evidenced-based cycle, tracked changes from year to year and collected, analyzed and disseminated data to key stakeholders for continuous improvement. Research questions were created to guide data collection and analysis around INTERFACE activities. In addition, the evaluation used a quasi-experimental design to assess program impacts. The purpose of the outcome/impact analysis was to vigorously evaluate the participant outputs and impacts of the INTERFACE Project. The research questions (Appendix B) were grouped by Implementation, USDOL Outcomes/Impact Analysis, INTERFACE Project Outcomes, and INTERFACE Project Deliverables.

A conceptual framework for implementation was created to describe how components of the INTERFACE Project planned to be implemented. The logic model (Appendix C) describes inputs of the program, activities that were created/used, outputs that were expected from the activities, and intended outcomes of the program. This framework was used to guide the evaluation.

For the outcome evaluation, the evaluation team gathered data from the 16 colleges on the nine USDOL outcome measures. To ensure accurate reporting from each of the individual colleges, the evaluation team provided guidance in the form of webinars, standard documentation and templates, phone support, and quality checklists. The evaluation team maintained ongoing communication with each college, which helped with data accuracy and consistency. Although the evaluation team provided extensive definitions and guides to aid data collection, it is possible that individuals interpreted definitions differently or that there was human error during data extraction. Other limitations to data collection included different data management systems at each college and changes to USDOL definitions mid-grant period.

Capacity building was measured through interviews with INTERFACE Project teams as well as stakeholder feedback surveys. These two data collection methods recorded the ways in which capacity was built at individual colleges and at the consortium level. There are many activities that were started, completed, and impacted because of the INTERFACE Project. The main indicator for capacity building was activity progress throughout the grant. INTERFACE project teams described the state of programs and processes at the beginning of the grant, provided updates on program change throughout the grant, and provided a final capacity building update.

#### *Impact Evaluation*

The impact evaluation, led by Dr. Brian Knaeble, used a quasi-experimental design to assess program impacts. Comparison groups were identified by using propensity score matching. Treated individuals were matched to untreated individuals using demographic and circumstantial variables retrieved from the 16 colleges' datasets. Treatment consists of any direct impact on a student by INTERFACE funds. Over the four-year grant period, the evaluation team collected quantitative data, including academic, wage, and employment data from the colleges and WTCS to assess the effects of INTERFACE.

The comparison sample was comprised of a stratified random sample of WTCS students, excluding the INTERFACE-funded programs and attempted to provide an accurate reflection of the variations and diversity within that population. The model of treatment assignment compared INTERFACE participant outcomes to non-INTERFACE participant outcomes. This allowed consortium stakeholders to draw inferences about INTERFACE program effectiveness. The impact of the INTERFACE Project was studied on five primary outcomes: Pass Rate, Retention, Graduation Rate, Employment Rate, and Wages.

The causal effect of treatment was defined as the difference between a student's eventual outcome and the outcome that student would have obtained had the grant not occurred. Since the hypothetical outcome is

counterfactual, students were matched based on covariate data where similar untreated students and outcomes were compared. This difference in outcomes was averaged over the population of all treated students and the result described as the treatment effect on the treated. This analysis was done separately for each outcome.

## **Implementation Findings**

### *Curriculum & Basic IT Skills Course (BITS) Course Development*

The 16 colleges collaborated closely with one another during the INTERFACE Project to develop, update, and implement IT related curriculum/programs. Department staff, including deans, associate deans, and instructors were charged with selection and development/modification of curriculum. These parties also worked closely with local employers to develop curriculum that was relevant to the skills needed in the field, which in most regions, aimed to fulfill a deficit in IT-skilled job candidates. Ultimately, the INTERFACE curriculum development is viewed as a success by both the colleges and the collaborating employers. The following curriculum and program outcomes happened due to INTERFACE:

- Development and modification of 148 courses
- Creation of 80 new credentials
- Improvements to stacked and latticed credentials
- Updates to career pathways
- Prepared students entering the workforce with relevant IT skills and applied IT experiences

Another example of collaboration and curriculum development was the creation of the BITS courses. Individuals from seven of the 16 colleges developed content for educational modules and Fox Valley Technical College (FVTC) turned the content into an interactive online course. The BITS Course built capacity for serving incoming students who lack basic computer skills. Most colleges indicated having some type of plan for serving students with insufficient computer skills, but most often, they did not have any in-house resources. The course was shared internally at each college and with external partners (job centers, Workforce Development Boards (WDBs), libraries, jails, etc.). All curriculum development was completed on time and according to the original design. Much of the work was completed ahead of schedule.

### *Program Design and Development*

Most colleges created new credentials and curriculum, while focusing on the creation of new and updated career pathways and stacked credentials. To keep current with industry standards, all programs in WTCS are required to have a Program Advisory Committee (PAC) that includes local employers. New programs were created when a credential had value in the local workplace. Employers helped define career pathways, identify new software, textbooks, and other supplies needed to keep students up to date with the technology being used in the field.

Colleges' remained organized and on track during program design and development and design due to their program administrative structure. The program administrative structure is similar across colleges and consists of Project Contacts (Deans, Associate Deans, Grant Administrator, and INTERFACE Project Managers), Finance Contacts (Accounting, Finance Directors, and Accounts Payable), and Evaluation Liaisons (Institutional Researchers, Data Analysts). These teams of 4-6 individuals worked together to plan, coordinate, and implement the grant deliverables. The consistent administrative structure aided the INTERFACE Project Manager.

### *Work-Based Learning Opportunities*

Fourteen colleges implemented or revised internships/work-based learning opportunities for the INTERFACE-funded programs. These opportunities provided students with real-world work experience that were applicable to their program of study. For many students, the internship experience led to full-time employment. These

opportunities were vital for students as they could apply their skills in a work setting while also learning and growing in a safe environment. Local employers collaborated with the colleges to provide these opportunities. Many of these were existing relationships that were strengthened, while some were newly forged. In both cases, these relationships will be beneficial for future work beyond the INTERFACE Project.

#### *Skills Assessment & Career Guidance*

All colleges used a standardized assessment (COMPASS or ACCUPLACER) to determine if an individual's abilities, skills, and interests were aligned with the grant program. These assessments focused on the core skills such as Math, English, and Reading. If an individual had a skill deficit, specific remedial course opportunities were presented to them. Colleges' admission department and program department were responsible for conducting the assessments and following-up with students who needed additional assistance. INTERFACE stakeholders said the assessments were useful for placing students into programs.

All colleges provided career guidance to INTERFACE participants; however, this was done in a variety of ways. Some colleges used grant-funds to hire staff to provide specific support to students in INTERFACE programs. Other colleges used their project team or existing student support initiatives on their campus. Northwest Wisconsin Technical College (NWTC) created a new position that had a dual purpose, Academic & Career Advisor. This role was responsible for providing career pathway guidance by assisting Network and Computer Support students with course selection and sequencing, along with job preparation (e.g., resumes, interview skills, etc.). NWTC found this model to be very successful and said that they intend on trying the position in other program areas.

#### *Contributions from Workforce Development Organizations and Employers*

The Regional Collaborative Planning Initiative was created to improve relationships between the 16 Wisconsin Technical Colleges (WTCS) and 11 WDBs across the state of Wisconsin in each of their regions. The goal of the initiative was to ensure the relationship between colleges and WDBs were aligned in their visions for serving students and displaced workers. Initially, the plan was to hold regional meetings for WDBs and colleges to discuss industry trends, challenges, and opportunities while building strong partnerships. However, travel barriers prevented some groups from attending, which led to revisions of the plan to be more specific to colleges and their WDBs. This change was done to increase partner buy-in, increase engagement between the partners, maximize communication, and foster relationships to encourage long-term collaboration.

At the beginning of INTERFACE, colleges' relationship with their workforce partners varied across the state. INTERFACE leadership worked as a facilitator of the initiative to help each college determine the best approach with their WDB. The meetings between the colleges and WDBs started because of INTERFACE, but the conversation was around each college and workforce partner including in-need job skills, opportunities for collaboration, and discussion around their goals.

This initiative has built varying levels of capacity across colleges. These relationships will allow colleges and WDBs to better serve students now and in the future beyond the INTERFACE Project. In addition to helping students, these collaborative relationships will help WTCS colleges apply for and receive grant funding. The colleges, WDBs, and industries know how to work together for common goals; thus, creating a collaborative atmosphere for success in future grant outcomes.

In addition to working closely with WDBs to identify skill deficits, employers have worked closely with colleges on program design, curriculum development, leveraging of resources, and job placement for students. Many employers served on college PACs to help with curriculum development. By having employers involved in PACs, colleges could ensure that their curriculum would teach students the skills needed in the real world, as well as meet the needs of employers in their region. Some employers even donated software to colleges to

guarantee students had exposure to relevant IT applications. Employers stated that colleges were responsive to their needs and prepared students for their work environment. Thus, the colleges' curriculum satisfied industry standards. Employers collaborated with colleges to offer internships for students. Colleges held job fairs and career expos, which allowed INTERFACE students to network with potential employers, practice interviewing, and even secure employment. By having employers invested in the colleges' IT programs and offering internship and career opportunities to students, sustainability of these programs is much more feasible.

### **Participant Impacts & Outcomes**

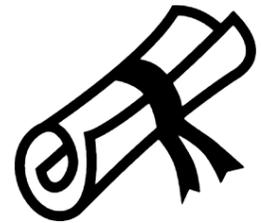
As of September 30, 2017, the INTERFACE Project successfully met five of the nine outcomes. One additional outcome was nearly met. Three outcomes were unmet. These numbers are expected to increase for the final Annual Performance Reporting (APR) submission as new wage/employment data will be used to update outcomes in November 2017. The numbers in Figure 1 below are representative of the INTERFACE grant in its entirety.

Figure 1. INTERFACE Student Outcomes



**4,962** Unique Participants  
Served *(Exceeded projection by 62%)*

**33%** of Participants Completed  
a TAACCCT-Funded Program of  
Study *(N = 1,615)*



**2,618**  
Credentials Earned

**63,673**  
Grant-Funded Credit  
Hours Completed

**1,011** extra  
graduations  
*due to INTERFACE*



**1,068**  
extra jobs  
*due to INTERFACE*



**135** dropouts prevented

Table 1 below is a summary of the five primary outcomes related to the INTERFACE Project. Four outcomes had a causal estimate increase, indicating the TAACCCT funding likely contributed to the positive impact. Only one outcome (wages) had no evidence for a positive impact. Table 2 below describes the nine USDOL outcomes and whether the INTERFACE project met each of these outcomes.

Table 1. Five Primary INTERFACE Outcomes

Outcome	Causal Estimate	Impact (on the treated)
Pass Rate	2.5% increase	An extra 0.5 credit per student
Retention	3% increase	135 students retained or dropouts prevented
Graduate	112% increase	1,011 extra graduations
Employment (non-incumbents)	31% increase	1,068 extra jobs
Wages (incumbents)	Likely zero	No evidence for an increase

Table 2. Nine DOL Outcomes and Percentage Served

Nine DOL Outcomes	Projection Exceeded	Projection Almost Met	Projection Unmet
	Actual	Projected	Percentage Served (%)
#1: Total Unique Participants Served	4,962	3,058	162%
#2: Total Number of Participants Completing a TAACCCT-Funded Program of Study	1,615	1,629	99%
#3: Total Number of Participants Still Retained in Their Program of Study	7,039	1,490	472%
#4: Total Number of Participants Completing Credit Hours	6,265	2,928	214%
#5: Total Number of Participants Earning Credentials	2,088	1,673	125%
#6: Total Number of Participants Enrolled in Further Education After TAACCCT-funded Program of Study Completion	8	591	1%*
#7: Total Number of Participants Employed After TAACCCT-funded Program of Study Completion	33	1,269	3%*
#8: Total Number of Participants Retained in Employment After Program of Study Completion	10	1,103	1%*
#9: Total Number of Those Participants Employed at Enrollment Who Received a Wage Increase Post-Enrollment	1,327	817	162%

*\*final data will be collected in November 2017*

### Conclusions

All 16 colleges effectively collaborated on all initiatives and activities related to the INTERFACE Project. Project outcomes were largely met with most activities being rated as a Strength or Super Strength. The activities that were rated as an Opportunity were in the areas where the consortium had to modify the original plan due to changing circumstances. Overall these modifications were a success, but did not meet the goals as originally stated in the project narrative.

Several key lessons were taken away from the INTERFACE Project. One component that assisted the success of this project was the consortium's ability and willingness to collaborate. This collaboration was crucial to understanding ambiguity and overcoming barriers when working on a large-scale project with many

stakeholders. INTERFACE Leadership sought to continually foster collaboration and did this through bi-annual meetings (held at a variety of locations across the state) and monthly web/phone conferences. These meetings and conferences were an effective way to keep the consortium up to date on vast amounts of information along with providing stakeholders professional development opportunities.

Most colleges used INTERFACE funds to provide additional student support to grant-funded programs. Colleges reported positive effects on both academic and non-academic support. This was likely a key component in student success. Most colleges are unable to continue offering specialized student support due to lack of funding. One college will continue to offer, and even expand their student support to other programs.

INTERFACE Leadership saw the value in Regional Collaborative Planning (strengthening relationships between colleges and WDBs) and having a dedicated facilitator for the work. INTERFACE Leadership had success using the Facilitator model to initiate conversations around the benefits of collaboration between colleges and WDBs. Many relationships were strengthened because of the work completed during INTERFACE. This work will continue to positively impact the service of displaced workers in the state of Wisconsin.

The PLA initiative was rated an Opportunity because the deliverable was not met consortium wide. However, this rating should not be viewed as problematic, as significant, positive work was completed. Several colleges had an existing process that was effective and did not need revisions. Other colleges made significant improvements standardizing PLA college-wide and making students more aware of the opportunities.

The INTERFACE Project was an interesting case study. This was a consortium based project, yet the colleges were allowed some freedom on how they decided to spend grant funds based on their specific needs. This allowed a variety of approaches and strategies to be tested. For future research, it is suggested to look more in depth at the impact of the variety of student support roles/models. Most of the colleges spent grant funds on student support; however, support was provided in a variety of ways, which made it difficult to determine a best practice. Future studies should compare pre/post academic data as well as qualitative data related to the impact of student support.

Better understanding of the facilitators who helped with the Regional Collaborative Planning initiatives is also important. It is believed that this facilitator may be influential with the beginning stages of building relationships, especially if the colleges have a limited relationship or no relationship with their Workforce Development Boards or employers in their area.

The INTERFACE Project was successful due to strong leadership, exceptional collaboration, and a consortium-wide commitment to serving students, key contributions from external partners, and funding from the United States Department of Labor. The impact of this project will be present across the State of Wisconsin for years to come.

## Project Overview

The TAACCCT program is funded by the USDOL. This program exists to help community colleges expand and improve their ability to offer educational programs that can be completed in two years or less and prepare workers for high-wage, high-skill occupations. In 2013, the WTCS received a Round 3 TAACCCT grant to create INTERFACE.

The INTERFACE Project has worked to strengthen computer skill competency and career pathways in information technology-related programs through strategic alignment between community colleges, business partners, current TAACCCT recipients, the workforce development system, and WTCS. The INTERFACE Project has focused on two components of IT:



**Basic computer literacy skill development**



**Information technology-related career pathways that lead to family sustaining wages in high growth occupations.**

## Evaluation Overview

The lead institution, Northcentral Technical College (NTC), retained the University of Wisconsin-Stout (UW-Stout) Applied Research Center as the third-party evaluator. The UW-Stout Evaluation Team has overseen the evaluation design, implementation (including data collection and analysis), reporting, dissemination, and publication of results. Reporting of the evaluation results has followed the prescribed timeline from the USDOL's Solicitation for Grant Applications (SGA).

This evaluation used a quasi-experimental, concurrent mixed methods design. Using both qualitative and quantitative data sources simultaneously allowed the evaluation team to provide a thorough analysis and triangulate results. The primary goal of the evaluation was to help the consortium and the USDOL understand the impacts and outcomes of the INTERFACE Project. A secondary goal, fulfilled by this report, is to provide summative feedback to stakeholders with the intent of facilitating continuous improvement efforts at each of the colleges after the conclusion of the grant period.

The evaluation is grounded in the UFE principles as described by Michael Quinn Patton. UFE is an "approach based on the principle that an evaluation should be judged on its usefulness to its intended users."<sup>1</sup> The evaluation team has ensured that all aspects of the evaluation are useful to the consortium lead, individual colleges, and USDOL. Strong, collaborative relationships between the team and project leaders have enhanced the collection of data and provided insight into the progress being made at many different levels.

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<sup>1</sup> Patton, M. Q. (2008). Utilization-Focused Evaluation. Thousand Oaks, CA: SAGE Publications.

## Evaluation Activities

The core evaluation team was formed in January 2014, by project managers Libby Smith, M.S. & Aric Gregg, M.S. Phillip Stoeklen, M.S. joined the team in November 2014 as a Research Technician. Levi Roth, M.S. joined the team in January 2015 as a project manager. Brenda Krueger, M.S. joined the evaluation team as a project manager in July 2015. Gina Lawton, M.S. joined the team in May 2016 as the data manager and provided analysis support for the final years of the project. Brian Knaeble, PhD, joined the team in April 2014 to help carry out statistical aspects of the impact evaluation. This includes the model of treatment assignment, propensity score matching for the impact analysis, analysis and interpretation of results.

Evaluation activities have been the shared responsibility of all team members. These activities included site visits, survey development and administration, data collection and analysis, report development, presentation of results, and regular communication with project leadership. Table 3 provides an overview of major evaluation activities and is not intended to be inclusive of every action taken by the team.

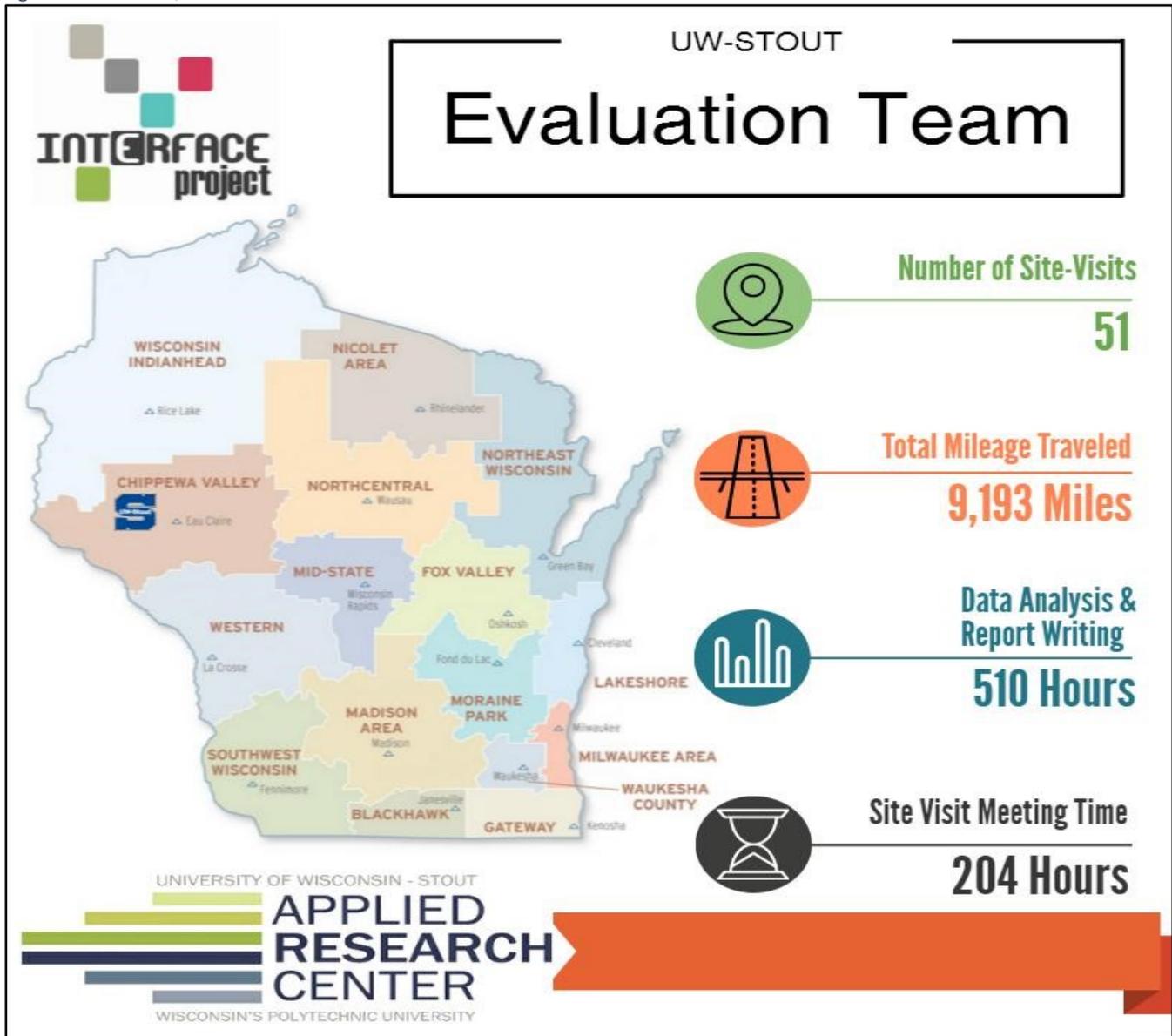
Table 3. Evaluation Activities

Evaluation Team Activity	Timeframe	Outcome/Deliverable
<b>Phone meetings with Project Leadership</b>	Weekly meetings since January 2014	<ul style="list-style-type: none"> <li>• Provide project updates, review evaluation deliverables, regular formative feedback, etc.</li> </ul>
<b>Logic Model &amp; Evaluation Plan Development</b>	January - April 2014	<ul style="list-style-type: none"> <li>• Stakeholder planning session</li> <li>• Master Logic Model</li> <li>• Comprehensive Evaluation Plan</li> </ul>
<b>College Site Visits</b>	51 visits Summer 2014 Spring 2015 Spring 2016 Spring 2017	<ul style="list-style-type: none"> <li>• On-site data collection through interviews, observation, document collection.</li> <li>• Developed college-level reports with findings and recommendations</li> </ul>
<b>Bi-Annual Consortium Meetings</b>	2014: May, October 2015: April, October 2016: April, October 2017: March	<ul style="list-style-type: none"> <li>• Report out on plans and findings</li> <li>• Evaluation capacity building for stakeholders</li> </ul>
<b>Annual Performance Reporting Data Collection</b>	2014-2017: Fall & Spring	<ul style="list-style-type: none"> <li>• Coordinate with project leadership on process</li> <li>• Provide guidance to colleges on data collection procedures</li> <li>• Collect, verify, and report outcomes to project leadership</li> </ul>
<b>Annual Progress Surveys</b>	Once a year (2014-2016)	<ul style="list-style-type: none"> <li>• Administered to project leaders, staff, faculty</li> <li>• Report out to project leadership and colleges on progress</li> </ul>
<b>Data Dictionary Data Collection</b>	January 2015 (pilot), July 2015, January 2016, July 2016, and February 2017	<ul style="list-style-type: none"> <li>• Tracks participant demographics, enrollment, retention rates, persistence rates, and completion.</li> </ul>

**Qualitative Data Collection**

Project stakeholders at the 16 colleges were interviewed at least once per year for a total of 51 site visits. Site visits were typically conducted by two members of the evaluation team. The visits generally lasted a half day and consisted of group interviews with project leadership and students, individual interviews with project staff and faculty, document gathering and analysis, and classroom observations. Each college received a summary report of the site visit which included activity progress updates, participant outcome tracking, best practices, challenges, and recommendations. While this work represents just a small portion of the work done by the evaluation team, the site visits provided enlightening information pertaining to daily activities of TAACCCT programming as well as informative student perceptions about the influence of TAACCCT on their education. A comprehensive list of the individuals interviewed is provided in Appendix A. Figure 2 provides an overview of the time spent conducting these site visits.

Figure 2. Site Visit Qualitative Data Collection Statistics



The table below is a list of abbreviations and acronyms used throughout the report.

Table 4. Abbreviations & Acronyms

Abbreviation	Title
ACE	American Council on Education
APR	Annual Performance Reporting
AQIP	Academic Quality Improvement Program
BITS	Basic IT Skills Course
BTC	Blackhawk Technical College
BU	Bellevue University
CAEL	Council for Adult and Experiential Learning
CPL	Credit for Prior Learning
CVTC	Chippewa Valley Technical College
DACUM	Develop a Curriculum
FVTC	Fox Valley Technical College
GTC	Gateway Technical College
INTERFACE	Intentional Networks Transforming Effective and Rigorous Facilitation of Assessment, Collaboration, and Education
LTC	Lakeshore Technical College
Madison	Madison Area Technical College
MATC	Milwaukee Area Technical College
MAWIB	Mid America Workforce Investment Board
MPTC	Moraine Park Technical College
MSTC	Mid-State Technical College
NATC	Nicolet Area Technical College
NTC*	Northcentral Technical College*
NWTC	Northwest Wisconsin Technical College
PAC	Program Advisory Committee
PLA	Prior Learning Assessment
QRP	Quality Review Process
SGA	Solicitation for Grant Applications
SME	Subject Matter Expert
SWTC	Southwest Wisconsin Technical College
TAA	Trade Adjustment Assistance
TAACCCT	Trade Adjustment Assistance Community College and Career Training
UFE	Utilization-Focused Evaluation
USDOL	United States Department of Labor
UW-Stout	University of Wisconsin-Stout
WCTC	Waukesha County Technical College
WDB	Workforce Development Board
WIDS	Worldwide Instructional Design System
WITC	Wisconsin Indianhead Technical College
WTC	Western Technical College
WTCS	Wisconsin Technical College System

\*Consortium Lead

## Stakeholder Feedback

Overall, project stakeholders agreed that the INTERFACE Project had significant positive impacts. On a final progress survey of the project, 98% of stakeholders felt that INTERFACE was strategically aligned with their college’s mission, vision, and values. Similarly, 99% of stakeholders agreed that this project allowed their college to provide prospective students with access to training and education. When stakeholders were asked if the INTERFACE Project allowed them to serve more low-income students at their college, 91% agreed.

## Evaluation Findings & Rating System

The implementation evaluation plan aligns with the priorities, strategies, and activities developed by INTERFACE leadership to accomplish the goals of the TAACCCT program (as written in the Project Narrative submitted to USDOL). The following sections present the findings of the evaluation team for each activity and they are presented in the order established by project leadership. Data presented throughout this report pertains to activities happening across the 16 Wisconsin Technical Colleges.

Following the description of activities and the answers to the evaluation questions for each activity the evaluation team has provided an Interim Evaluation Status (as of January 2016) and a Final Evaluation Status (as of September 2017), which is a subjective measure of progress for each area. For the purposes of this report we have modified the rating system utilized by the Higher Learning Commission’s Academic Quality Improvement Program (AQIP) Portfolio System. This can be seen in Table 5.

Table 5. Progress Rating Scale

Rating	Interpretation
<b>Super Strength</b>	Activities were seen as a best practice or goals were exceeded
<b>Strength</b>	Consortium met goals as planned
<b>Opportunity</b>	Significant work was accomplished, but goals were not fully met as planned
<b>Outstanding Opportunity</b>	Goals were not met as planned

<b>Priority 1: Increase attainment of IT Certifications, Certificates, Diplomas, and Other Industry-Recognized Credentials for Target Populations in Growth Industry Sectors (Core Element 1, 2, 5, &amp; 6)</b>
Strategy 1.1: Strategic Alignment (Core Element 5)
Activity 1.1.1: <i>Establish a framework for aligning regional/state initiatives that consists of a Wisconsin Team that has representation from five Regional Collaborative Planning Teams</i>

### Evaluation Questions for Activity 1.1.1:

- Was a framework established for aligning regional/state initiatives?
- To what extent did representatives feel that they were involved at an appropriate level for the framework planning?
- To what extent did participants perceive the planning process to be effective?

The original design of the regional collaborative planning consisted of three primary objectives:

- 1) Host five regional collaborative planning meetings twice a year to bring WDBs, colleges, and industry partners together to discuss strategic alignment related to work-based training opportunities, emerging industry trends, challenges, and opportunities.

2) Host statewide meetings twice a year with WDBs, colleges, and government leaders to share information mined from regional collaborative planning meetings, discuss new and ongoing strategic initiatives, and partner on relevant strategies to decrease resource duplication and increase advancement.

3) Host a statewide sector strategy conference annually to present missions and visions, share best practices, and increase knowledge about sector strategies: employer engagement, partnership building, effective industry analysis, and design of industry-relevant training programs.

The design for Regional Collaborative Planning Teams changed significantly over the first two years of INTERFACE. Although the original vision for regional collaborative planning involved the above specifications, adjustments were made early on to address challenges and accommodate opportunities for improvement that quickly became visible after launching the initiative. The original plan was to strengthen and build relationships and changes to the plan were needed to be successful. For example, regional conversations faced barriers due to travel distances. In many cases, stakeholders needed to travel over 3 hours one-way for an hour meeting. With few guiding practices available, INTERFACE facilitators took a trial-and-error approach to bringing everyone together. It was only through many meetings, reviews, and revisions that this initiative developed into a useful deliverable. As a result, a list of best practices for regional collaborative planning was created. These steps allow colleges to engage partners and include:

- Increase partner buy-in
- Increase engagement between the colleges and their partners
- Maximize communication to reduce future barriers
- Leverage resources by sharing best practices and areas of opportunity
- Foster relationships that lead to long-term commitment

Through the INTERFACE Project each college was required to spend a portion of their local TAACCCT award on developing partnerships with their local workforce development boards. This looked very different in each college district. Some colleges used funds to hire navigators to partner with their WDB to recruit, retain, and co-enroll participants in grant-funded training and activities. Other colleges contracted with their WDB partners to provide customized services to participants including career exploration in Information Technology and Boot camps. At other colleges, contracts were negotiated with the local WDB to focus on coordination of services including employer contacts and meetings, feedback, data verification, and monitoring of progress.

To help with developing collaborative relationships, an INTERFACE Facilitator was hired to develop and lead a series of “town hall” meetings in each region. These meetings were designed to engage each stakeholder in an open dialogue. From these conversations, it became evident that a sustainable network was necessary for collaborating on issues that are relevant to colleges and workforce organizations in the region.

In Year 2, the INTERFACE Facilitator left the project prematurely, which slowed the progress of the collaboration. INTERFACE Project Leadership took over the facilitator role and continued to work with the two entities to promote collaboration. Also during Year 2, a survey was administered to INTERFACE colleges asking faculty, staff, and administrators if they were involved in the Regional Collaborative Planning efforts. Of the 210 respondents, only 13 reported they were involved. Those respondents were asked to report their satisfaction with the progress that has been made in regional collaborative planning. The majority indicated that they were satisfied (54%) or very satisfied (31%) with the progress. Fifteen percent of the leaders expressed dissatisfaction with the advancement of the planning process. This survey highlighted the need to involve people outside of the INTERFACE Project (at each college) who have existing relationships with workforce development.

Although few individuals identified their involvement with the Regional Collaborative Planning efforts, several meaningful partnerships were established due to INTERFACE. Examples of these partnerships are described

below: how the partnerships evolved, the points of intersections between the college and their WDB(s), and the activities they were involved in together.

At one large urban college, TAACCCT grant funds were used to re-establish a partnership with the local workforce development board partners. This partnership had become almost non-existent. After months of laying the groundwork, using TAACCCT funding, the College and the WDB implemented a contract for customized services. The contract brought the college and the WDB together bi-monthly to reach common goals. For example, a County Veterans' Officer remarked that he had referred Veterans to the college, but lost contact after that. The College responded by creating a new process to ensure the Officer remained informed on future referrals. While this may seem minimal, acts like this allowed partners to trust each other, leading to even more collaboration. Another benefit from this collaboration was the annual Information Technology job fair that connects students with employers. This isn't a typical job fair, because students present their IT skills to an employer audience. During the presentations, employers can assess the soft skills of the students. Ultimately, employers can identify if a student has the skillset they need at their company without wading through multiple hundreds of applicants. This activity will be sustained after TAACCCT and keep this partnership moving forward.

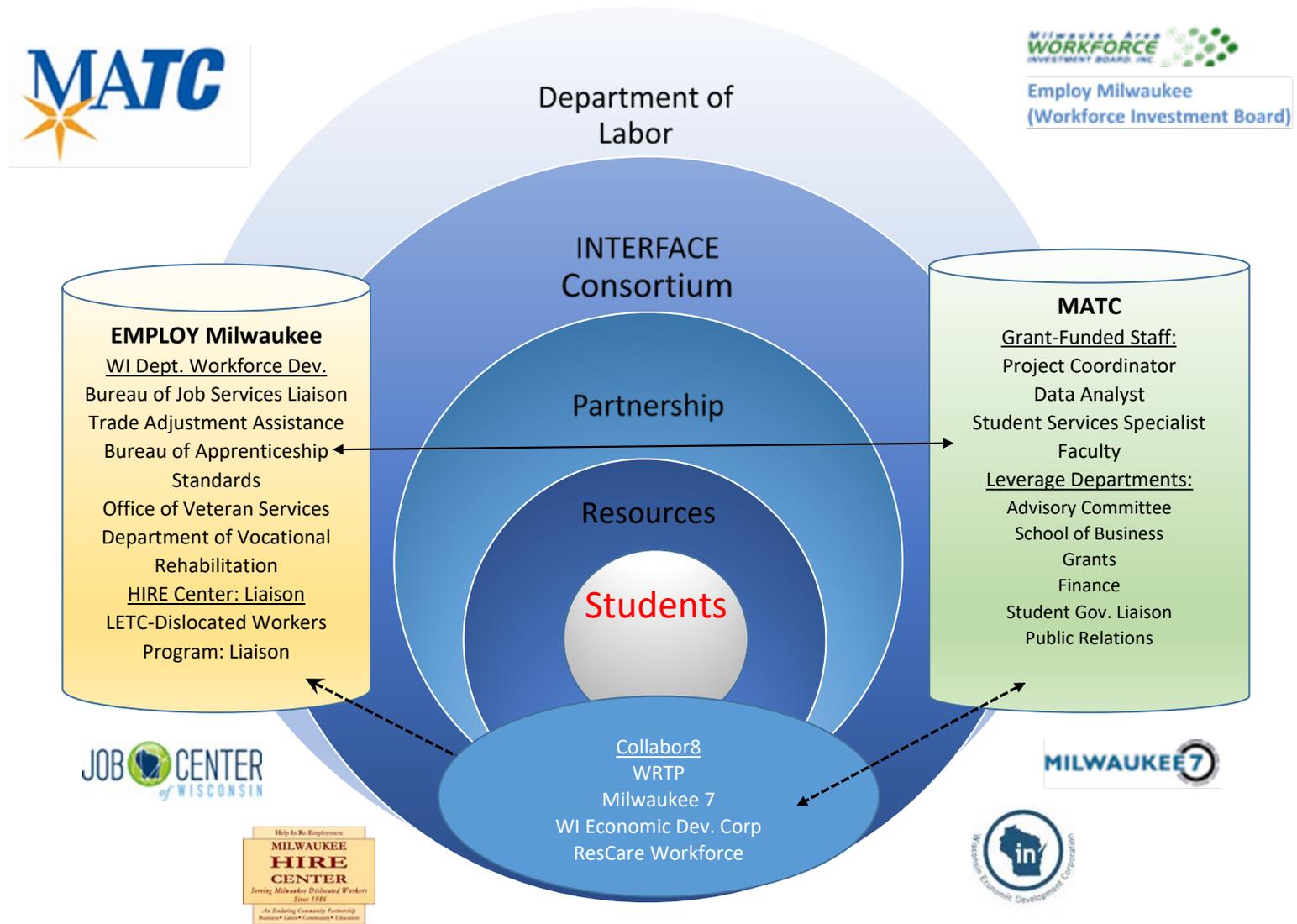
Another College worked to collaborate and improve relationships with their local WDBs, which had otherwise grown stagnant. Before TAACCCT, there was little trust and incentive for the two parties to work together. The WDB was focused on moving people into jobs as quickly as possible, whereas the college was interested in training people before placing them into positions, leading to higher, family-sustaining wages. Therefore, the organizations worked against each other rather than working together to support students and employers. To enhance collaboration, the College used the BITS course that had been developed earlier with INTERFACE TAACCCT funds to engage the WDB partners. This strategy worked and the WDB was interested in using BITS as well as collaborating more with the college. By being responsive to the external partners, the College could re-establish the lost relationship. Partners began to meet regularly to share information, leverage resources, and plan activities that were mutually beneficial.

Finally, in one Wisconsin WDB region, several WTCS colleges are part of an industry-driven Information Technology Sector Alliance that meets bi-annually. The partnership brings together education, government, training, economic development, labor and community organizations to focus on workforce needs. Partners exchange information, collaborate on activities that include pilot projects, expanded interventions, and joint agreements. Specifically, employers focus on solving major talent issues. One strategy is to ensure that IT courses can be completed in high school. This requires getting high school teachers the professional development needed to meet the minimum certification requirements to teach college-level courses. Employers are on board to provide the training and/or the payment for this training. The Alliance also focuses on talent questions including retention and growth strategies. Employers have agreed to provide engagement and familiarization tours so new IT graduates or those nearing completion can explore career opportunities in the region. Finally, educators who attend these meetings get a faster understanding of changing industry needs that impact the design and delivery of IT career pathways and those funded by TAACCCT.

Overall, TAACCCT funds provided an opportunity for relationships to develop between these parties. Where silos had previously limited the impact that individual organizations had on unemployed, underemployed, dislocated, TAACCCT-eligible workers and Veterans, these strengthened partnerships have had a significant impact on aligning resources to help students succeed.

The regional collaborative planning framework was never meant to be a simple approach for fixing workforce-college communication across the state. The regional collaboration initiative was by its very nature “regional” (i.e. the relationships are only as strong as regional players want them to be). A high degree of college and workforce development agency commitment was necessary for making this framework function properly. This grant made it possible for the technical colleges to collaborate with workforce development partners in a meaningful way. This framework was applied in diverse ways regionally, but has nevertheless led to promising possibilities. The relationships that were created because of INTERFACE were initiated by the colleges, increasing the likelihood that they will be sustained beyond the conclusion of the grant. More importantly, the diverse implementation has allowed project leadership to identify best practices for improving collaboration and communication among these partners. Below, in Figure 3, is a visual description created by MATC of how they perceive their relationship with their WDB and other key stakeholders.

Figure 3. MATC's Collaborative Relationship with the WDB and Stakeholders



### **Interim Evaluation Status for Activity 1.1.1: Opportunity**

*Progress to date has been slow as project leaders needed considerable time to assess the needs of the different regions. The initial plan was adapted to better meet the diverse needs of each college and region. Plans remain on track with a focus on developing sustainable networks for improved collaboration across all educational and employment issues. The evaluation team anticipates that deliverables for this area will be completed by the end of the grant period. The evaluation team will continue to assess progress, attempt to gauge satisfaction with the process, and measure the strength/growth of the relationships that are built between stakeholders. A case study approach may be used to showcase a particularly successful regional network.*

### **Final Evaluation Status for Activity 1.1.1: Opportunity**

*Regional collaborative planning is a long-term goal for the WTCS colleges. Progress across the grant period varied by region, with some colleges being better positioned to strengthen regional workforce relationships and collaboration than others. The INTERFACE Facilitator was a key component of this work. The role was vital in initiating conversations between colleges and WDBs. Many colleges strengthen relationships with the WDB(s) in their region during the INTERFACE Project. MATC represents an example of one such college that has been successful in developing meaningful regional relationships. Factors that affected whether a college was successful in this activity, included: employer density in college district, employer willingness to engage in a meaningful capacity, providing funding for a position, and the priorities of the college in terms of grant activities. MATC contracted for customized services with Mid America Workforce Investment Board (MAWIB); therefore, a MAWIB employee was a core member of MATC's project team. This liaison between the college and workforce provided increased opportunity to engage the workforce in regional collaborative efforts. This initiative was rated an Opportunity due to the original plan of establishing a framework not being completed; however, there was significant work completed in strengthening relationships across the state.*

*Activity 1.1.2: Research and adopt statewide baseline core competencies for a standardized computer literacy course*

### **Evaluation Questions for Activity 1.1.2:**

- Was there a statewide set of core competencies developed for the standardized computer literacy course?
- To what extent did each of the partners contribute to the development of the core computer competencies?
- Was the implementation of the computer literacy course aligned with the evidence-based practice?
- To what extent did the colleges deliver the course as they intended to?
- In what ways did the 16 WTCS colleges implement the basic computer literacy course differently?
- To what extent did the Workforce development board feel that the basic computer literacy course helped students develop the skills needed for success in the workplace?
- To what extent did employers feel that the basic computer literacy course helped students develop the skills needed for success?

In 2014, a statewide set of core competencies were developed for the computer literacy course. In addition to the 16 WTCS college representatives; WTCS system administrators, INTERFACE project administration, and workforce partners were also present at the competency planning meeting and contributed to the development of course competencies. The meeting was facilitated by a Learning Design Consultant of the Worldwide Instructional Design System (WIDS). This meeting was vital in the establishment of 11 core competencies for computer literacy. The Consultant distributed a validation survey following the initial meeting to gather feedback from a variety of stakeholders across the consortium. The results showed high levels of support for the proposed competencies, assessment strategies, and learning objectives.

Project leadership determined in the first year that the computer literacy course would be delivered in an online, digital format that colleges could use as they saw fit. It was also determined that the course could be made available to external stakeholders, including users both nationwide and internationally. Modules would be developed for each of the 11 core competencies. The course came to be known as the [Basic IT Skills \(BITS\) Course](#). Individuals from 7 of the 16 colleges developed the content for the individual modules. Then a team at FVTC turned the curriculum content into digital learning objects to be used in an online format.

The computer literacy course was aligned with evidence-based practice. This was accomplished by utilizing many evidence-based tools during the development process. One such tool was the Develop a Curriculum (DACUM) tool, which allowed the project team to plot out necessary skills, traits, and tools necessary for basic IT training. By designing the material in a digital format, the team decided that learning modules would be the best delivery method for lessons. To develop modules that were aligned with evidence based practice, the well cited Horton e-learning by Design Model was used. This allowed the project team to create e-learning content that involved meaningful activities, assessments, and learning games.

The team involved in developing modules established a basic design template for the course components based on the intended users of the program. The modified model focuses on what the design team calls an “Absorb, Do, Connect” format, which served as a guideline for instructors in curriculum development. The instructional design coordinator indicated that the process of aligning the original learning objectives with the online learning objects was quite difficult, but also important. Feedback from the development team was positive overall. They noted that some of the completed modules were already being used by workforce partners to gain feedback on their utility. The course has been accessed by users across the world, including 140 countries, totaling to 204,929 views.

#### **Interim Evaluation Status for Activity 1.1.2: Super Strength**

*The BITS Course is in use at colleges, workforce development organizations, and even prisons. Consortium members quickly came to an agreement on a set of competencies, leading to the development of the course. The course was made available to INTERFACE participants, and many others, with the help of an Instructional Designer. Stakeholders were eager to begin using the BITS Course at their colleges or workforce development organizations. There were a small number of colleges that were not as invested in the course, mainly due to the feeling that they already addressed the 11 core competencies in other courses. Overall, this activity proved to be a super strength, as the consortium worked to rapidly finalize the core competencies that would serve as the framework for the course curriculum.*

#### **Final Evaluation Status for Activity 1.1.2: Super Strength**

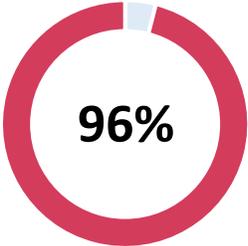
*The BITS Course was a tremendous success at the consortium level. It was a large-scale undertaking that was successfully implemented on time in a way that is meeting the needs of learners across the world. It was successfully implemented in some capacity by all 16 technical colleges. Eleven of the 16 colleges chose to use local Workforce Development Agencies/Job Centers to disseminate the BITS materials. The primary cited reason for colleges targeting Workforce Development Agencies was that such agencies are a natural point of contact with individuals seeking employment and advancement opportunities. Having Job Centers help prepare individuals for success in the workplace and educational environments made sense to colleges planning for BITS implementation. Other venues chosen by colleges to disseminate the BITS materials included: libraries (both public and college-based), college resource centers, senior centers, and even county jails and prisons. Overall, the BITS course was a super strength for the project because it represented an example where the consortium worked together to address a common statewide educational gap.*

<p>Strategy 1.2: Establish statewide systematic framework for PLA in IT and Related Careers (Core Elements 1, 2 &amp; 6)</p>
<p><i>Activity 1.2.1: Consortium Colleges will participate in professional development training sessions offered by Wisconsin's Making the Future (Round 2 TAACCCT) focused on implementing PLA</i></p>
<p><i>Activity 1.2.2: All colleges will commit to implementing at least 1-3 recommendations in their grant funded programs pathway</i></p>

Evaluation Questions for Activity 1.2.1 and 1.2.2:

- How many professional development training sessions were offered by Wisconsin's Making the Future?
- How many representatives from the 16 WTCS colleges attended the training sessions?
- Were the professional development training session attendees satisfied with their experience?
- What PLA strategies did each of the 16 WTCS colleges commit to implementing?
- Was the implementation of the PLA aligned with evidence-based practice?
- To what extent did students feel the PLA process was effective?

In 2015, two Prior Learning Assessment (PLA) professional development training sessions were offered to the WTCS colleges by Wisconsin's Making the Future Project (TAACCCT Round 2) through their contracted work with Council for Adult and Experiential Learning (CAEL). At least one individual from each of the 16 colleges attended the PLA training sessions. Of the individuals who attended trainings, 96% were satisfied with the training they received.



**Satisfied with the PLA training**

In Year 2, INTERFACE stakeholders answered survey questions regarding PLA at their college. Overall, 69% of respondents indicated that their college's process for PLA changed since the beginning of INTERFACE. Others indicated that their PLA had not changed because their current PLA process was strong or that they were in the early stages of changing their PLA process.

The same participants were asked the question, "Was the implementation of the PLA aligned with evidence-based practice?" The respondents who had working knowledge or experience regarding PLA agreed that implementation aligned with evidence-based practice.

In September 2015, the UW-Stout Evaluation Team attended a Credit for Prior Learning (CPL) Summit held in Madison, Wisconsin and conducted interviews with various stakeholders across the WTCS consortium. The focus of the interviews was to obtain stakeholder input on satisfaction of professional development trainings and gather thoughts on the PLA process. There were general positive comments about colleges' PLA processes and comments on how TAACCCT (Rounds 2, 3, & 4) has been instrumental in the improvement of PLA. A comment was made about the need to go through the PLA process to identify gaps and subsequently create a plan to address deficiencies found. Process maps were referenced as the primary tool to assess gaps. The desire to create a more formalized PLA process for the colleges was also a common point of discussion.

In Year 3, a survey was administered to INTERFACE stakeholders to gather more information about the implementation of PLA initiatives. 94% of respondents felt their college was on the right track regarding the implementation of prior learning assessment. Respondents also provided positive comments regarding their colleges' PLA experience. Some comments referred to developing a commitment to their PLA process because of the INTERFACE Project. Another comment mentioned the employment of a CPL Specialist role was due to the efforts of the INTERFACE Project and was extremely beneficial.

In Spring 2016, the UW-Stout Evaluation Team interviewed INTERFACE participants at 14 of the 16 colleges. Approximately 150 INTERFACE participants were interviewed. When CPL/PLA was addressed during the student interviews, most colleges had students who were both aware and unaware of the opportunity to receive credit. Students from three colleges were not made aware of the opportunity and indicated they would have been interested in pursuing CPL had they known about it. On the contrary, students from five colleges reported they received credit. For example, at NTC a few students could transfer advanced high school courses. Additionally, several Madison students received credit for prior coursework and IT experience. Students from two colleges indicated they could have qualified for credits, but they wanted to go through the classes again to refresh their memory and learn anything new they might have previously missed.

The INTERFACE Project also put a focus on improving strategies that colleges use to award credit for prior learning to Veterans. One component of this was to increase faculty's skills and knowledge in mapping military training and occupations to course equivalencies. A work group, known as VET-IT, was created to help pinpoint measures that would be most impactful and sustainable. The American Council on Education (ACE) assisted in the discussions on mapping practices and the potential for training faculty from WTCS. In 2016, ACE held trainings for IT faculty from 15 of the 16 colleges that consisted of: improving knowledge and skills of the process for evaluating military training, mapping military training to course equivalencies, and utilizing the ACE Military Guide to map military training to six IT courses.

**Interim Evaluation Status for Activities 1.2.1 & 1.2.2: Opportunity**

*Progress on the implementation of 1-3 prior learning assessment recommendations from Round 2 has been mixed, but generally slower as compared with other activities. Recommendations for PLA from Round 2 (CAEL) have been unclear or delayed. However, as stated above, all colleges have participated in the PLA training and the evaluation team observed increased investment in the process over Years 1 and 2. Some colleges already had robust PLA practices, so implementing changes has not been a priority. Other colleges see the PLA work as very challenging and have focused on increasing buy-in at their college. Also, consortium leadership has partnered with the system office (WTCS) to develop a system-wide process on PLA for Veterans in IT. The final activity offers significant improvements to PLA for all 16 colleges. Progress in this area significantly contributes to the work undertaken by Wisconsin's TAACCCT Round 4 ACT for Healthcare on this issue.*

**Final Evaluation Status for Activities 1.2.1 & 1.2.2: Opportunity**

*Over half of stakeholders (69%) said their college's PLA strategies changed since the beginning of the INTERFACE Project. These changes include, but are not limited to, streamlining the PLA process, making PLA opportunities more visible to students through marketing or online implementation, and creating standardized PLA strategies for veterans, consortium wide. These improvements will provide current and future students more opportunities to receive credit for prior learning. Nearly all stakeholders (94%) said their college accomplished its goals of implementing PLA strategies. The evaluation team also conducted student interviews at 14 of the 16 colleges. Students at 5 colleges mentioned they received CPL, while students at 3 colleges mentioned they were completely unaware but would have been interested in opportunities available to them. Some students mentioned they knew CPL was available to them but chose to take classes to refresh their memory/skills. INTERFACE improved strategies for awarding credit for prior learning for veterans statewide. Through INTERFACE many of the colleges have made vast improvements to their PLA processes and structural changes that will eventually help students. Colleges indicated they will continue to improve and maintain CPL processes for all prospective students. Colleges should continue to make students aware of CPL opportunities during the enrollment process and fully implement the changes they have created or are in the process of finalizing. PLA has been a strength at those colleges who have implemented changes in their strategies because of the INTERFACE Project. However, this deliverable was not met by all colleges as it was originally planned. Thus, this activity remained an Opportunity for the consortium overall.*

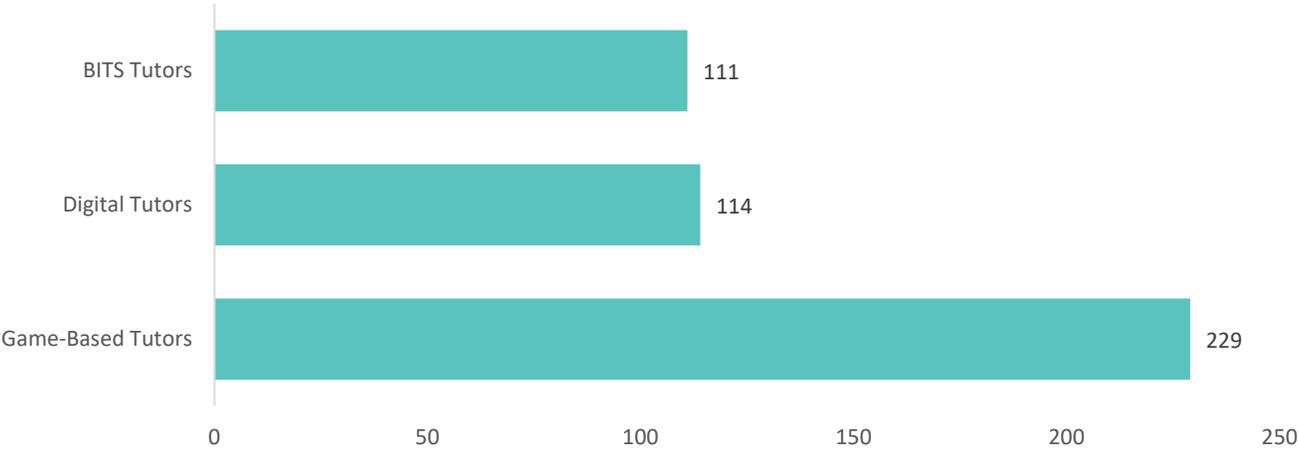
<b>Priority 2: Introduce or Replicate Innovative &amp; Effective Methods for Curriculum Development &amp; Delivery</b> to Improve Learning Outcomes to Address Industry Needs (Core Elements 1, 2, 4, & 6)
Strategy 2.1: Online and Technology-Enabled Supplemental Learning (Core Element 4 & 6)
Activity 2.1.1: Develop the processes to build, store, pilot, and use project-related Mobile Applications for the 16 consortium members' programs of study

**Evaluation Questions for Activity 2.1.1**

- What processes were used to develop the Mobile Apps?
- What Mobile Apps were implemented at each of the 16 WTCS colleges?
- To what extent did instructors feel they had appropriate training to effectively utilize the Mobile Apps in their course(s)?
- To what extent were instructors satisfied with the use of Mobile Apps?
- To what extent did students feel they had appropriate training to effectively utilize the Mobile Apps to learn?
- To what extent were students satisfied with the use of Mobile Apps?
- Did student performance increase after the use of the Mobile Apps?

During the initial phase of digital tutor planning, FVTC travelled to all campuses that had shown interest in the tutor project. Prior to these visits, some faculty members expressed apprehension about their involvement; however, the project leader (Jay Stulo) found that meeting with colleges helped establish buy-in. He found that the colleges' hesitance in the digital tutor project had to do with either time restrictions (i.e. campus instructors did not have time to develop tutor curriculum) or some programs were not conducive to digital tutors. Figure 4 describes how many and which types of digital tutors were created during INTERFACE.

**Figure 4. Digital Tutors Developed during INTERFACE**



The development of digital tutors involved a multi-stage process. Each college could submit up to 20 digital tutor topic requests. Nine colleges contributed content for the digital tutor development. From these topic requests, FVTC would review and begin to develop digital tutors based around the proposed content. Throughout the development process, FVTC utilized a “rapid prototyping” technique. As a result, FVTC and the instructor that proposed the digital tutor topic worked together throughout the design stages. FVTC reported that the practice of rapid prototyping increased collaboration and ensured that the content being displayed in the digital tutor stays true to the instructors’ visions.

While developing digital tutors, FVTC identified the need to bring in additional help from external sources to meet their goals. An instructional designer was added to the project team to help develop digital tutors related to the BITS initiative. In addition to the instructional designer, an external contract was developed with well-known author and podcast host, Carl Franklin, to write digital tutor content. FVTC emphasized that the author was great at explaining complex concepts. Franklin also plans on promoting the digital tutor repository on his far-reaching podcast.

Overall, colleges that contributed to the development of digital tutors found that the process was time consuming, but worth the effort. Instructors realized that there would be a considerable investment of time and energy in the early phases of development; however, future development and integration into the courses would become easier with practice. Instructors noted that the application of digital tutors in their curriculum was very fluid, as they could be used in many ways.

FVTC did not explicitly gauge college satisfaction with digital tutors; however, several of the colleges indicated that the digital tutors were well received by students and faculty. Colleges are now invested in the implementation of digital tutors. For example, NTC submitted the maximum number of digital tutors allowed (20) for creation. Milwaukee Area Technical College (MATC) stated that the digital tutors allowed their instructors to effectively present information, which allows students to efficiently absorb curriculum content. Specifically, digital tutors were helpful in the mobile application development coursework. Students also stated that the digital tutors were user-friendly, requiring little to no training on the platforms. Finally, Wisconsin Indianhead Technical College (WITC) was excited about having computerized visualizations to replace hand-drawn modelling.

FVTC developed, launched, and maintained an online repository for the 454 digital tutors developed during the project. They have stated that the repository will be an excellent resource for years to come. The digital tutors are also accessible all over the world, having been viewed by 12 different countries thus far.

**Interim Evaluation Status for Activity 2.1.1: Super Strength**

*The digital tutor initiative got off to a slow start. Few colleges initially saw the benefit of the digital tutors and many faculty lacked an understanding of what was involved in development. The project leader continued to champion the initiative by meeting face-to-face with INTERFACE faculty across the state, building understanding, buy-in, and participation. The work on this project has since progressed quickly and is well ahead of schedule. It is expected that the consortium will far exceed their planned deliverable for this activity. The evaluation team will explore the use, satisfaction, and utility of digital tutors in the remaining years of the grant.*

**Final Evaluation Status for Activity 2.1.1: Super Strength**

*The digital tutor initiative was quite successful. FVTC exceeded their initial goal of 375 digital tutors by over 20%, with a final digital tutor count of 454. Most of the WTCS colleges have incorporated digital tutors in their curriculum, and have noted during campus site visits that the digital tutors have been well received by students. Out of the 16 colleges, 11 directly contributed to the development of digital tutors. The remaining 5 colleges noted that they did not assist with developing tutors for several reasons. Most notably, the colleges either did not want to duplicate tutors being developed and made available by other colleges, or their programs were not typical IT programs, so the digital tutors were not particularly useful for their content delivery.*

Strategy 2.2: Implement Industry-Driven Road Maps/Adult Career Pathways in IT and Related Careers (Core Elements 1, 2, & 4)
Activity 2.2.1: <i>Develop, modify, contextualize, or chunk curriculum based on program and pathway using the Worldwide Instructional Design System</i>
Activity 2.2.2: <i>Develop natural entry/exit points to and from employment</i>
Activity 2.2.3: <i>Organize curriculum, as possible, into stackable and/or latticed industry recognized credentials that are portable and/or transferable</i>

#### Evaluation Methods for Activities 2.2.1, 2.2.2, 2.2.3:

- Process survey for curriculum staff
- Track fidelity to timeline
- Track the number of entry/exit points created
- In what ways were the programs and program designs improved or expanded using grant funds?
- What was the program administrative structure?
- What delivery methods were offered?
- How was the curriculum selected, used, and/or created?
- Was the newly developed curriculum developed and offered in alignment with the timeline?
- To what extent do instructors feel the newly developed curriculum aligns with learning objectives?
- What contributions did each of the partners make regarding:
  - Leveraging of resources; Sustainability of the INTERFACE Project; Program design; Curriculum development; Placement of students; Program management; Training
- Did the colleges strengthen their partnership with Job Centers/WDBs?
- To what extent do employers feel the newly developed curriculum aligns with industry standards?

#### Curriculum & Course Development

Overall, colleges have reported moderate satisfaction regarding the progress and development of curriculum. Consortium colleges have noted that curriculum development has been a challenging component of the grant. The time involved in curriculum development has been extensive and several colleges reported issues regarding the time involved in meeting DOL curriculum mandates. The slow-moving approval process was cited by colleges as the primary challenge to curriculum development.

**148**  
**New or Updated**  
**Courses**

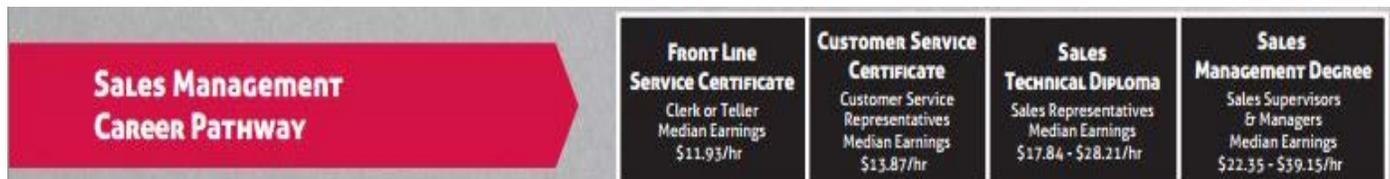
The curriculum development process at the colleges is now complete. As of October 2016, 100% of the course curriculum had been submitted for review and approved. The development process has created new curriculum or modified curriculum for 148 courses. The 148 courses have been posted to SkillsCommons.

The consortium has created 80 new credentials through the INTERFACE Project. Colleges have made concerted efforts to ensure that there are stacked and latticed credentials at their institutions which create natural entry/exit points to and from employment.



Below are three examples of stacked and latticed credentials at various colleges. Western Technical College (WTC) has a series of stacked and latticed credentials in sales management that students can progress through. They also have certificates embedded in multiple pathways. An entrepreneurship certificate is being embedded into both sales management and business management courses. The progression can be seen below in Figure 5, which is an excerpt from WTC’s program materials for their AA-Sales Management program.

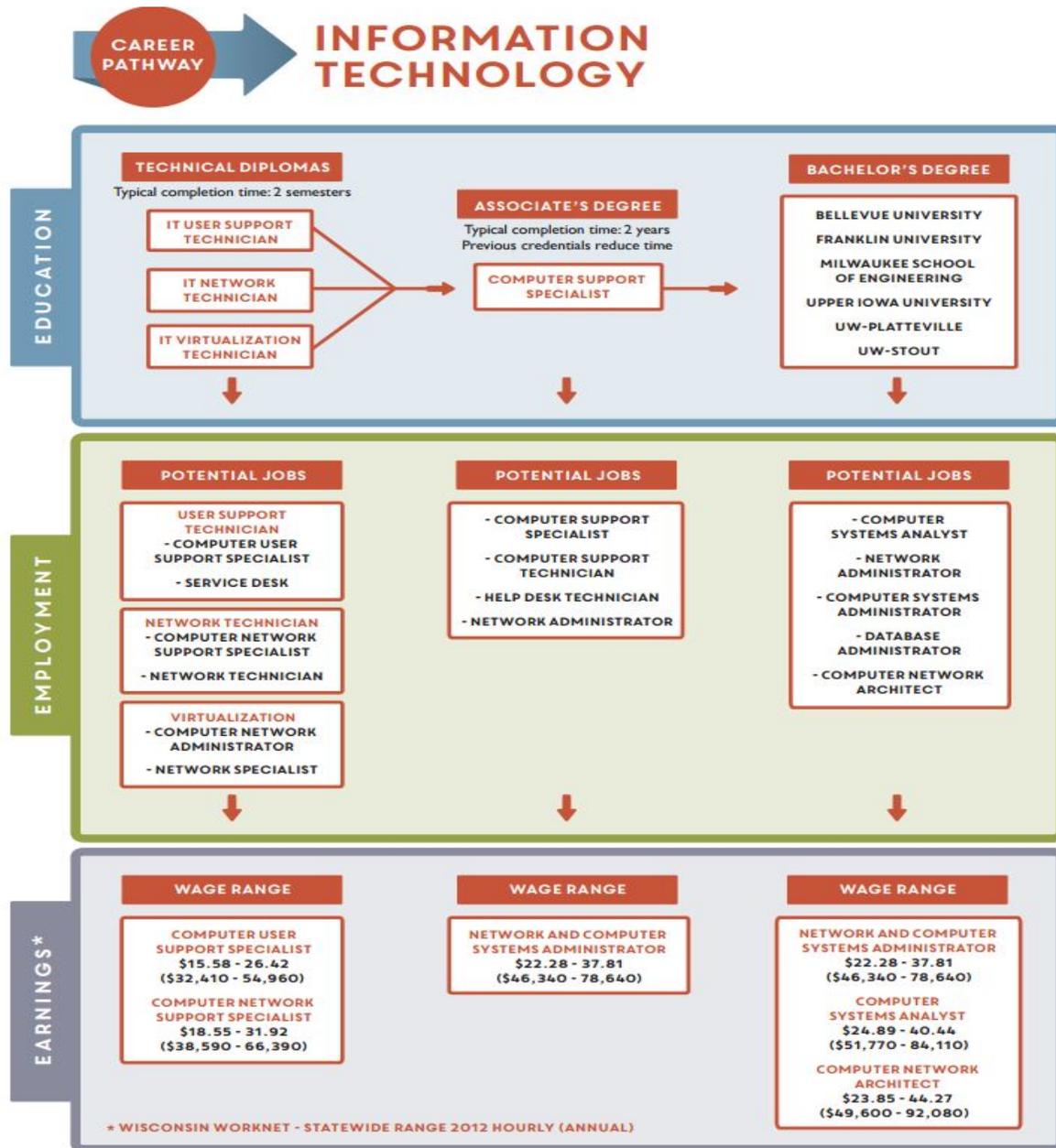
Figure 5. WTC’s Sales Management Career Pathway



Madison Area Technical College (Madison) has also created a very intricate series of stacked and latticed credentials from which students can enroll and progress in IT related fields. These include Microsoft Office Basic certificate, IT Help Desk Support Specialist technical diploma, followed by an associate’s degree in IT Fundamentals of Security and IT Fundamentals of Networking. These programs are designed to allow students to enroll at different progression points based on their background and skills, creating a more appropriate entry point for prospective students.

Nicolet Area Technical College (NATC) has built modularized curriculum with clear entry and exit points for students who are looking to gain specific skills in the Information Technology field. This modularized curriculum is also aimed at helping students find an entry level position rapidly after completion. The progression can be seen in Figure 6 below. The visual is from NATC’s program materials for their AAS-Computer Support Specialist program.

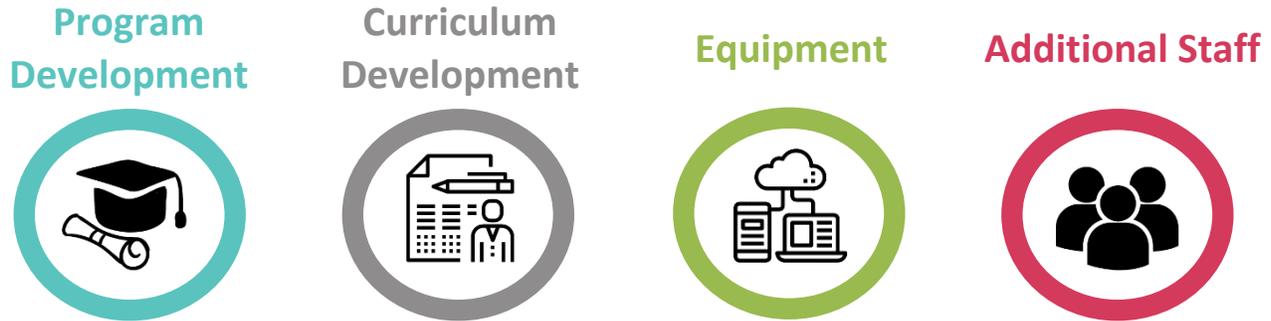
Figure 6. NATC's Information Technology Career Pathway



### Program Development

All 16 colleges improved or expanded programs using grant funds, but they did so in a wide variety of ways. Almost all colleges created new credentials and curriculum, while focusing on the creation of new and updated career pathways. Some colleges also updated their curriculum, purchased equipment to better serve students, or used grant funds to hire additional staff (i.e. instructors, student support). Figure 7 indicates how programs were improved and expanded using grant funds. The four main categories below do not cover all the ways grant funds were used, however, they are the most common categories.

Figure 7. Program Improvement through Grant Funds



#### Program Administration

The program administrative structure is similar across colleges and consists of Project Contacts (Deans, Associate Deans, Grant Administrator, and INTERFACE Project Managers), Finance Contacts (Accounting, Finance Directors, and Accounts Payable), Evaluation Liaisons (Institutional Researchers, Data Analysts). These teams of 4-6 individuals have worked together to plan, coordinate, and implement the grant deliverables. The consistent administrative structure aided the INTERFACE Project Manager.

#### Delivery Methods

The delivery methods for the INTERFACE Project are varied across colleges including traditional, online, distance, and hybrid models. Each college tailored their delivery methods based on the needs of their students and the type of program. Below are three examples of how colleges are delivering their courses in unique ways to meet the needs of the students and program offerings.

- NATC is using Virtual Labs and Cisco Telepresence System to create distance learning opportunities for students who are not able to make it to campus. NATC has one of the largest districts geographically. The three locations utilizing the Cisco Telepresence System have enhanced learning experiences for students who do not come to the main campus.
- Gateway Technical College (GTC) utilizes a cohort model where students begin classes together and continue throughout the program. Students commit to 40 hours per week for up to 15 months to earn a technical diploma. The GTC project team has indicated this model requires dedication and group cohesion from students.
- Lakeshore Technical College's (LTC) Medical Coding Specialist program is offering blended courses. On-campus attendance is optional. All lectures are recorded and made available on LTC's Learning Management System, Blackboard. Students have been highly receptive to the blended model, even if they attend the class in-person. The recorded lecture allows them to revisit the material and enhance their learning.

#### Curriculum Development

Curriculum was selected and created in similar ways across the consortium. Colleges sought the assistance of both faculty and program advisory boards to assist with the selection of curriculum to be impacted by INTERFACE funds. Department staff, including deans, associate deans, and instructors were charged with development/modification of curriculum. All 16 colleges completed their curriculum development. Several colleges commented that one strength in their curriculum development process was their collaboration with local employers. This collaboration allowed colleges to meet the needs of local employers by ensuring that

curriculum would be relevant to the skills needed in the field. The main curriculum development challenge highlighted by colleges was that curriculum development is a time-consuming process, particularly for instructors. However, it was beneficial to have instructors involved in the curriculum process because they will be responsible for delivering the courses.

During the evaluation team site visits (halfway through Year 2), colleges overwhelmingly acknowledged that their newly developed curriculum aligns well with their learning objectives. At many of the colleges, the instructors helped establish learning objectives and were also involved in curriculum development, so the alignment was expected.

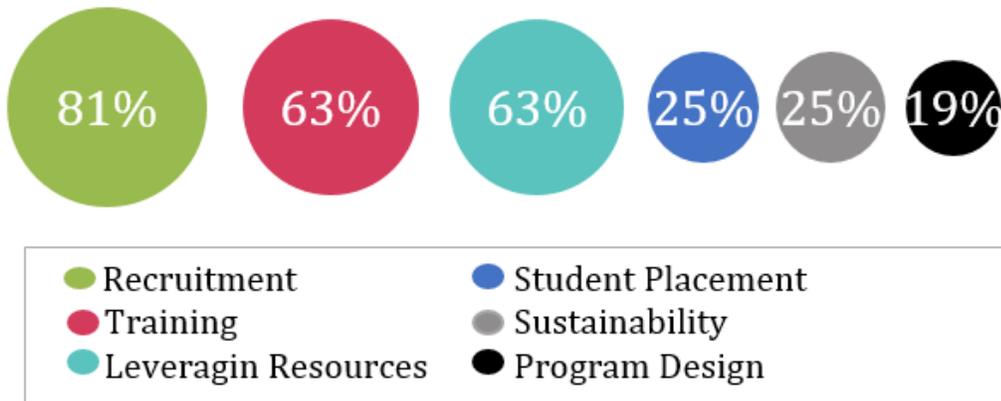
In Year 2, a survey was administered to INTERFACE stakeholders regarding their satisfaction with four areas of curriculum including: 1) Development Process; 2) Timeline; 3) Alignment with Industry Needs; and 4) Quality of Final Product. A four-point Likert scale was used to measure satisfaction. Most colleges were satisfied with all aspects of curriculum development. There was slight dissatisfaction in two areas of curriculum development including *Timeline* (5 colleges) and *Development Process* (3 colleges).

Nearly all respondents (99%) indicated satisfaction with the alignment between the newly developed curriculum and industry standards. Colleges used their program advisory boards for the development of programs. Employers are typically represented on the advisory boards, so they provided input for program and curriculum development. One college expressed that “16 businesses and industries assisted with the DACUM.” By Year 4, all 16 colleges agreed or strongly agreed that they had achieved their goals regarding curriculum development. Another strength in the curriculum development process was the Subject Matter Expert (SME) from the University of Wisconsin-Green Bay. Colleges sent their curriculum for review prior to completing development and submitting to WIDS. Rubrics were used by the SME and WIDS to provide quality assurance that all curriculum work was being held to the same standard and to ensure compliance with Americans with Disabilities Act and Universal Design for Learning.

#### Workforce Development Relationships

All 16 colleges have a relationship with one or more WDBs within their region. Each college has a unique relationship with each workforce partner, which means the contributions of workforce partners vary by college. Figure 8 below displays the ways that colleges collaborate with WDBs. Recruitment was the largest way in which colleges collaborated with WDBs (81%), followed by training (63%) and leveraging resources (63%). A smaller percentage of colleges indicated that they collaborated with WDBs for student placement, sustainability, and program design. This information was collected via an electronic survey to INTERFACE Project Team at each college.

Figure 8. Colleges and WDB's collaborate most on recruitment and training of students.



“Our workforce partners have been involved in almost all aspects. They are extremely committed to the project and have helped to make it a success.”

**-College Feedback**

*Involvement* (13 coded responses), *Student Support* (10 coded responses), and *Assisted with Recruitment* (9 coded responses) were popular themes. At the Spring 2016 site visit, Chippewa Valley Technical College (CVTC) indicated that collaboration between Student Support Services and Workforce Resources has dramatically increased since the beginning of INTERFACE.

**Employer Relationships**

Similarly, colleges have been collaborating with employers for the INTERFACE Project. Data has been collected on the relationship between colleges and employers via site visits by the evaluation team and through phone interviews with 12 employers across Wisconsin. Employers have been most involved with the program design, leveraging of resources, job placement of students, and curriculum development. Each of these activities were integral to the college’s development of programs and curriculum.

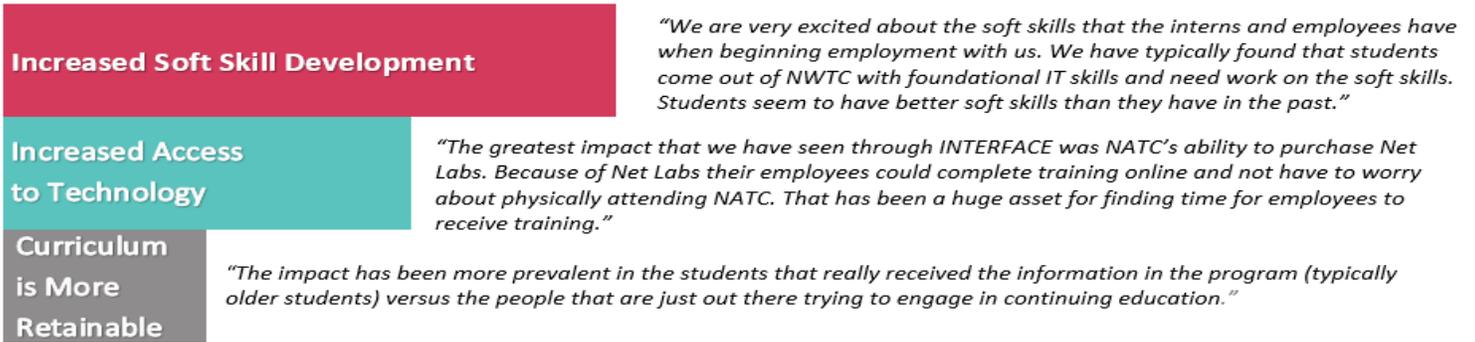
Interviews with employers were conducted to better understand the impact of INTERFACE. During employer interviews, employers were asked about the curriculum impact on student employability. Four employers indicated that colleges were responsive to their needs, three felt that students were better prepared for the work environment, and two suggested that students were developing stronger soft skills.

Employers were also asked about the impact of the new curriculum and programs on the graduates coming out of the INTERFACE programs. Three items were highlighted by the employers regarding impact of the new curriculum and programs: increased soft skill development, increased access to technology, and that impact of the program is contingent on the intention of the students. See Figure 9 below for details.

At the beginning of the INTERFACE project, a survey was administered to all 16 colleges to create a benchmark for the strength of relationship between colleges and their workforce partners. Additionally, a survey was administered to project teams at each college, and respondents were encouraged to complete the survey as a team. The results of this survey indicated that 11 relationships were considered strong or very strong, while 3 were considered weak or very weak.

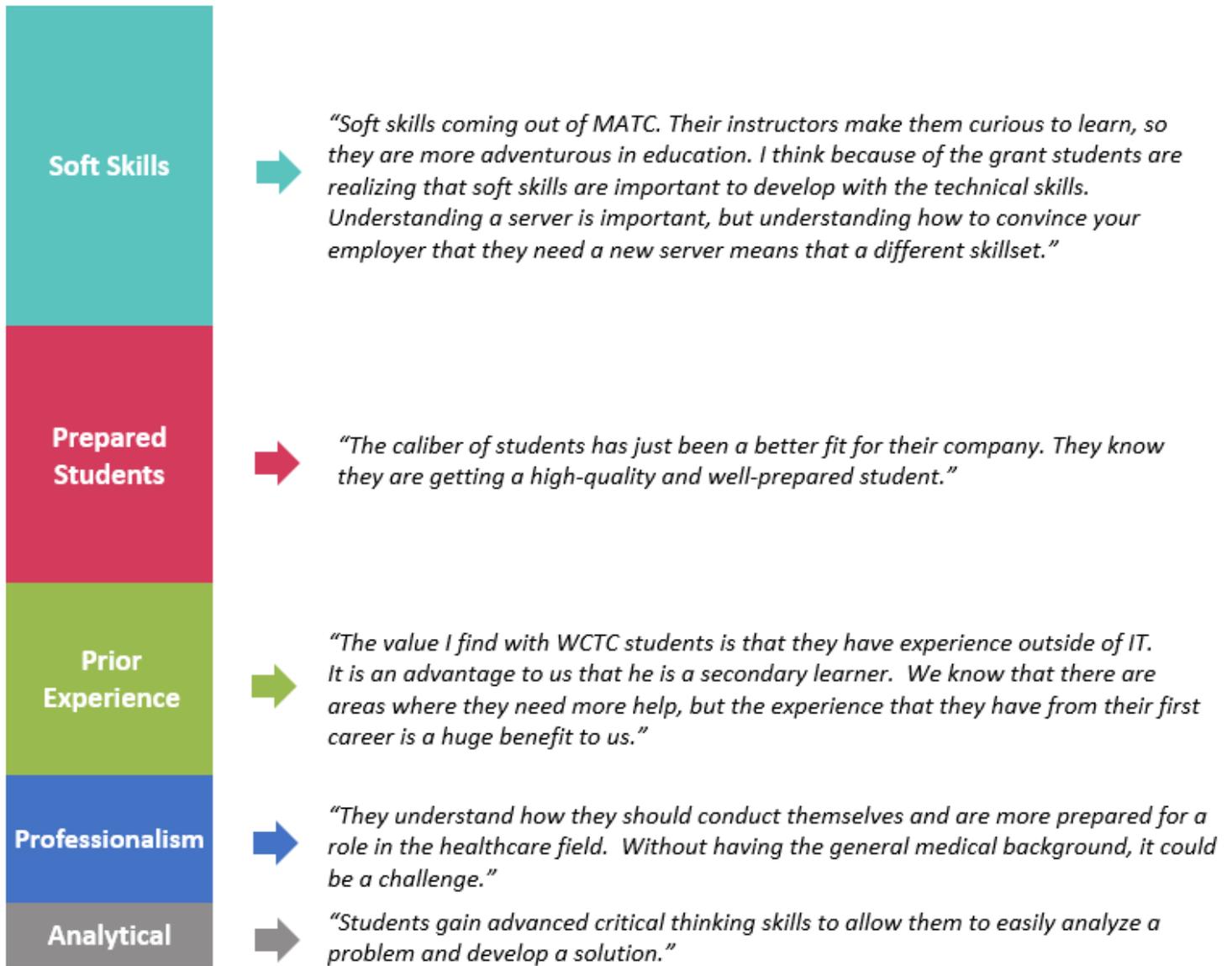
Key stakeholders were surveyed in Year 3 of the INTERFACE project and asked to describe the involvement of the workforce development partners with the INTERFACE project. *Significant*

Figure 9. New INTERFACE Curriculum Positively Impacted Employers



When employers were asked specifically about strengths and gaps in skill areas of new employees graduating from the INTERFACE programs, the topic of soft skills came up as both a strength and a gap. Ten employers mentioned soft skills, implying that soft skills are a top priority for employers. Five employers felt that soft skills were a strength and five others felt there was a skill gap related to soft skills. Other strengths of INTERFACE students discussed by employers included: well-prepared for the workforce, experienced outside of information technology, professionalism, and established analytical skills. See Figure 10 below for details.

Figure 10. Employers said students had excellent soft skills and were prepared to work



Although some employers felt soft skills were strengths of students, others felt like students needed to improve their soft skills. In addition to soft skills, employers also mentioned the following gaps in skills for INTERFACE students: internship experience, advanced skill development, and unavoidable gaps because of specialization. See Figure 11 for details.

Figure 11. Employers suggest areas of improvement for newly hired students



During employer interviews, employers were asked if they had any other feedback regarding their experience working with colleges on the INTERFACE Project. Three topics were discussed: relationship development, high-quality program development, and community. For details, see Figure 12.

Figure 12. Employers Appreciated INTERFACE



Key stakeholders were surveyed in Year 3 of the INTERFACE project regarding the importance of the involvement of local employers and workforce development partners to the success of the INTERFACE project. Responses indicated that most individuals throughout WTCS colleges found the involvement of employers (69%) and workforce development partners (38%) to be important to the success of the INTERFACE project.

**Interim Evaluation Status for Activities 2.2.1, 2.2.2, & 2.2.3: Super Strength**

*All colleges put a strong emphasis on program and curriculum development and modification. With only a few exceptions, colleges have been on track or ahead of schedule in completing this work. Curriculum development has presented challenges, primarily due to time constraints and the extra steps needed for approval and preparation for the curriculum repository. Program development and the creation of stacked credentials was completed early on for most colleges as the program design often stemmed from their strategic planning conducted prior to the INTERFACE program. Alignment with their existing plans and goals allowed them to proceed quickly to curriculum development. There is still considerable work to be done to move all 98 courses through the approval process and into the repository, but the partnership with WIDS should ensure this deliverable is met.*

**Final Evaluation Status for Activities 2.2.1, 2.2.2, & 2.2.3: Super Strength**

*Program and curriculum development and modifications were completed ahead of schedule. Colleges worked diligently throughout this process of strategic planning, program design and development, stacking and laticing credentials, and updating and creating new courses. 148 courses were developed and updated. All were reviewed by WIDS and posted to SkillsCommons (national repository) and the Wisconsin Repository. All 16 colleges have developed or strengthened relationships with the WDBs in their regions. In addition, colleges also collaborated with employers throughout the project through their advisory boards. Employers were pleased with the graduates coming out of the INTERFACE programs. When asked about the effect of curriculum on students' employability, employers discussed the responsiveness of colleges to their needs, indicated that students were well prepared, and highlighted the improvement of soft skills.*

*Activity 2.2.4: Continue to work with UW schools, as well as other 4-year institutions to ensure curriculum transferability and program articulation*

*Activity 2.2.5: Develop articulation agreement with Bellevue University in Nebraska*

**Evaluation Questions for Activity 2.2.4 and 2.2.5:**

- What articulation agreements have been created?
- What impact did the Bellevue University on-site representatives have on WTCS campus, programs, students, etc.?
- Were transfer opportunities increased for students?

As a partner in the INTERFACE Project, Bellevue University (BU) became the primary focus for the development of articulation agreements. BU is recognized as a leader in both online learning and in serving the veteran student population. A Memorandum of Understanding between BU and NTC was developed and approved in 2014.

Colleges partnered with them to extend participant education opportunities beyond the associate degree level. Several online information technology-related Bachelor and Master Degree programs are available through BU's National Center of Academic Excellence in Information Assurance Education, including Computer Information Systems, Cybersecurity, Management of Information Systems, and Project Management.

BU accepts credits earned in WTCS Associate Degree programs to fulfill General Education core curriculum requirements towards Bachelor Degree programs, as well as credit for training completed on the job or in the military. Through the articulation agreement with the WTCS colleges, transfer and application fees will be waived. BU also developed portal websites for WTCS colleges to allow easy access to information. These Smoothest Transfer portals allow students to calculate their transfer credits along with obtaining more information about BU and what they offer. Articulation agreements exist between BU and all 16 WTCS Colleges

and they have a physical office on the NTC campus. BU actively participated in the INTERFACE bi-annual meetings, presenting on best practices for serving Veterans and awarding credit through PLA.

In addition to the agreements with BU, several colleges have developed additional articulation agreements with other universities. Most these agreements are with universities within the University of Wisconsin System. A few examples of these are: University of Wisconsin-River Falls, UW-Stout, and University of Wisconsin-Eau Claire. A few colleges had strong articulation agreements in place prior to the INTERFACE Project. For example, Madison already had eight articulation agreements in place for their IT programs.

In Year 3, a survey was administered to INTERFACE stakeholders regarding project progress. Many respondents felt that their college was on the “right track” in terms of their progress on articulation agreements between their technical college and 4-year universities.

Also during Year 3, INTERFACE students were interviewed and asked a series of questions about their training. This included whether they intended to continue education at an institution that had articulation agreements with their respective colleges. Across the consortium, roughly half of the INTERFACE students interviewed indicated that they were planning on continuing education at another academic institution. Out of the six colleges where articulation agreements were discussed, most students were aware of the existing agreements. Students from two colleges indicated they were especially interested in a program at UW-Stout because it is offered online. At two other colleges, students recognized that furthering their education would make them more marketable. Although aware, students at one college felt their options were limited due to their certificate being specialized.

As of April 2017, Student Clearinghouse data indicated that 13 students that completed a grant-funded program had transferred to either another 2-year institute or a 4-year institute for continuing education.

**Interim Evaluation Status for Activity 2.2.4 & 2.2.5: Strength**

*Progress towards this deliverable was complete in Year 1 with the development of articulation agreements with BU. Some colleges already had several existing articulation agreements with UW schools and other 4-year institutions that they felt met the needs of their students. Some colleges have worked diligently to create new articulation agreements for both new and existing programs. The evaluation team will attempt to gauge if there is an increase in students transferring to 4-year institutions because of this work, but it is likely the real impact will be produced beyond the years of the INTERFACE Project.*

**Final Evaluation Status for Activity 2.2.4 & 2.2.5: Strength**

*This activity was largely completed in Year 1 with the development of articulation agreements with BU. Some colleges had existing articulation agreements with UW schools and other 4-year institutions that they felt met the needs of their students. Some colleges worked diligently to create new articulation agreements for both new and existing IT programs. Overall, the INTERFACE Project has increased the number of articulation agreements across the consortium thus increasing transfer opportunities for students. Based on student interviews, it appears the articulation initiative had a positive impact on the consortium. It is anticipated that the impact of the articulation agreements will be observed beyond the grant period as students complete their programs.*

*Activity 2.2.6: Train participants*

**Evaluation Questions for Activity 2.2.6:**

- Did retention increase for programs offered at the 16 WTCS colleges?
- What contributions did each of the partners make regarding recruitment of participants?

- Was an in-depth assessment of participants' abilities, skills, and interests conducted to select participants into the grant program?
- What student support services and other services were offered?
- Was career guidance provided and if so, through methods?
- How satisfied are students with the training they have received (classes, advising, internship/job search, resources (classroom equipment, digital tutors, learning tools, etc.))?
- What assessment tools and processes were used?
- Who conducted the assessment?
- How were the assessment results used?
- Were the assessment results useful in determining the appropriate program and course sequence for participants?

Retention has been on the forefront of the consortium's interests. Through various forms of student support, colleges reported increased retention across INTERFACE funded programs. Below are three examples of colleges who implemented a new student support role as part of the INTERFACE Project.

Blackhawk Technical College (BTC) created an Outreach Specialist position and hired Lab Assistants to offer students multiple forms of support. Specifically, the Outreach Specialist helped IT students manage academic activities by assisting with course scheduling, time management, and personal issues. The Lab Assistants help with classroom activities, aiding instructors, and offering additional open labs or office hours where students can receive support outside of class. Other colleges have specific support models in place to increase retention as well.

Northwest Wisconsin Technical College (NWTC) hired an Academic Coach and an Academic & Career Advisor to provide extra student support to INTERFACE participants. The Academic & Career Advisor is responsible for providing career pathway guidance by assisting Network and Computer Support for students with course selection and sequencing, along with job preparation (e.g., resumes, interview skills, etc.). The Academic Coach is responsible for offering academic assistance outside the classroom to increase student retention and completion.

Madison hired a Program Advisor to not only assist with outreach but a variety of student support services. This Program Advisor would attend community events, actively sought out demographic hubs (TAA, veteran, women, etc.), and promote IT programs and the INTERFACE Project to reach a wider demographic. The goal was to develop relationships with the individuals in the community through interaction and engagement. The Program Advisor would also assist with prospective students in their pre-application meetings and pre-assessments to see if the student would be a good fit for the respective program. By establishing a personal relationship with the student early on they were more receptive to feedback further on throughout their program of study. After enrollment, the Program Advisor would attend mandatory orientations with the students where they would provide information about the program, campus resources, and meet other members of their cohort. After orientation, the program advisor would use intrusive advising techniques to quickly address barriers to success. Such as, calling students during class if they were not in attendance.

### *Skills Assessment*

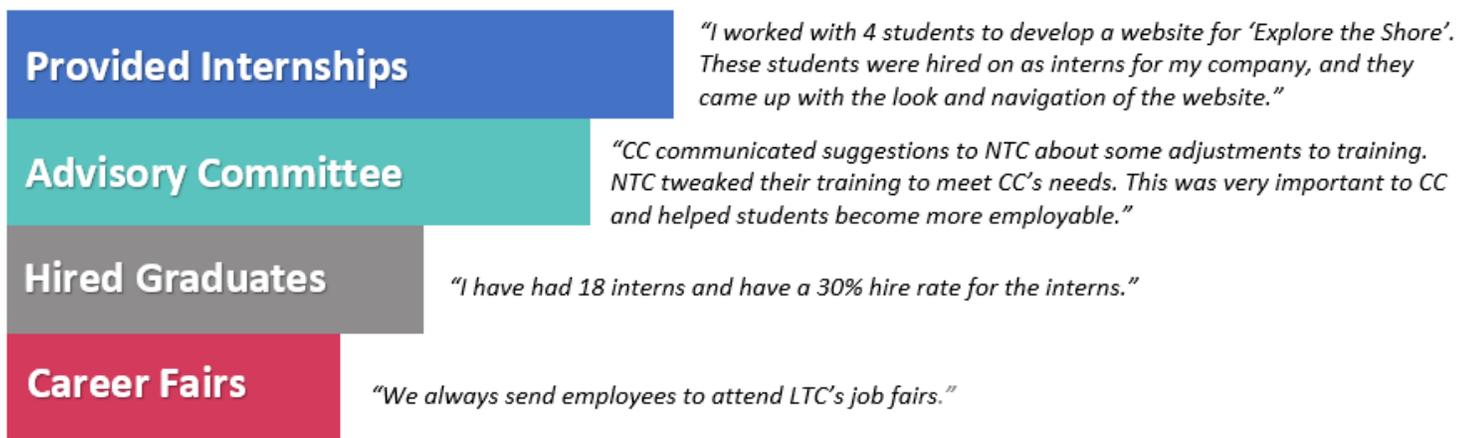
All colleges used a standardized assessment (COMPASS or ACCUPLACER) to determine if an individual's abilities, skills, and interests were aligned with the grant program. These assessments focused on the core skills such as Math, English, and Reading. If an individual had a skill deficit, specific remedial course opportunities were presented to them. Colleges' admission department and program department were responsible for conducting the assessments and following-up with students who needed additional assistance. INTERFACE stakeholders said

the assessments were useful for placing students into programs. In addition to the standardized assessments, WITC implemented a basic computer literacy assessment to determine skillset and fit in their IT programs. After pilot testing the assessment with INTERFACE, the assessment was used in other areas across the college as well.

### Employer Contributions to Recruitment

Nearly all technical colleges committed to developing partnerships with area employers as part of their INTERFACE work. During spring 2015 site visits, colleges reported interaction with employers through a variety of mechanisms including program advisory committees, internships and practicums, career fairs, and employer visits/presentations. Some colleges are also participating in additional employer partnership activities, such as lab/software use, project work, and job shadowing. Figure 13 is a visual and descriptions of how colleges and employers interacted and met the needs of INTERFACE participants.

Figure 13. Employers were Involved in INTERFACE



### Program Advisory Committee (PAC)

All programs in the WTCS are required to have a PAC to assist them in staying current with industry standards. Some PACs are more heavily involved with INTERFACE programs than others. For example, Madison reported very strong relationships with their PAC, especially the relationship with ServiceNow. ServiceNow is providing advanced software, textbooks, and vouchers for INTERFACE students to receive free certifications all at no cost to the college. Also, INTERFACE Project leaders at WTC indicated that they have a strong PAC that directly contributed to the development of the new career pathway in Sales Management.

### Internships, Practicums, and Job Opportunities

Thirteen colleges indicated they were actively working on or have implemented new internships/work-based learning opportunities. One unique example of a work-based learning opportunity is the Service Learning course at Waukesha County Technical College (WCTC). During the service learning course, students work with a local non-profit organization to assess and address the IT needs of the organization. Students are expected to develop relationships with the organizations and apply their IT skills in a real-world environment, which in turn increases community involvement. Additionally, it provides an opportunity for students to obtain a letter of recommendation, as well as the potential for future working relationships. Non-profit organizations benefit by having their needs met without the costs typically associated with IT services.

### Career Fairs, Summits, and IT Expos

Few colleges have offered IT-specific career expos, with most colleges utilizing existing career fairs to engage IT employers. Colleges are also providing exposure to employers through mock interviews, internships, IT Clubs, internship fairs, Veteran fairs, guest speakers, and on-site tours. BTC hosted an IT career expo where they had students set up booths to display their work to prospective employers. Several of the colleges also identified that they were going to invite more IT employers to future job fairs or hold IT-specific job fairs.

### Employer Visits/Presentations

Three colleges reported participating in employer visits and presentations. These colleges sought out audiences with local employers and then met with them to discuss their INTERFACE Project programs to encourage employer participation and advisement. WTC reported creating new relationships by utilizing this employer outreach method.

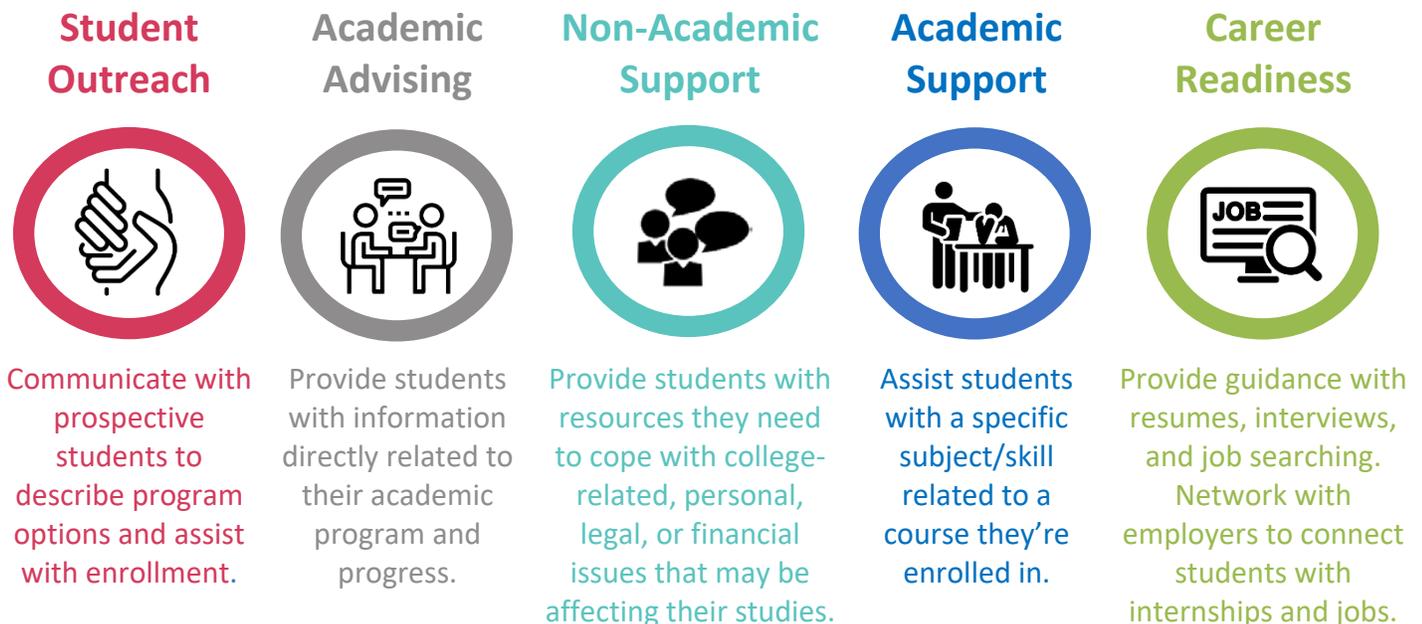
This same information was reiterated during employer interviews that occurred in Spring 2017 with 12 employers across Wisconsin. Eight employers indicated that they provided internships, seven sat on the college program advisory committee, five hired graduates of an INTERFACE program, and four attended career fairs. One employer indicated that, "I have been involved in almost every aspect of this project."

### Workforce Development Contributions to Recruitment

#### Student Support Services

Student Support was implemented in a variety of ways across the 16 colleges. Individuals in these roles had differing job titles and responsibilities. These services provided support in areas that students typically need assistance. The goal of the services was to increase retention, motivation, confidence, and success. Figure 14 displays the five types of student support provided to INTERFACE participants across the grant period.

Figure 14. Student Support Offered due to INTERFACE

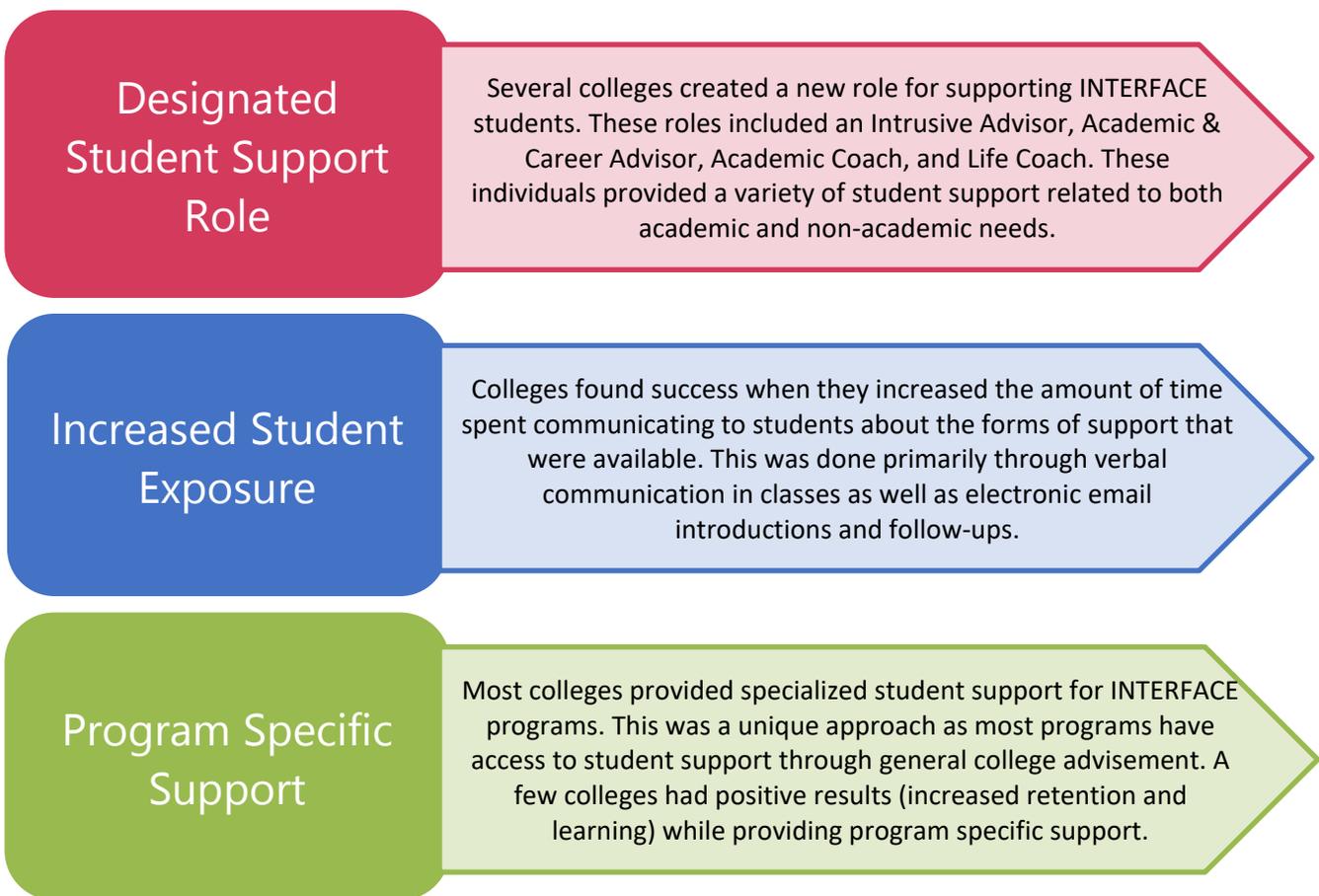


Colleges across the consortium, with a couple of exceptions, expanded student support services and positions at their campuses. The colleges that utilized student support personnel did so by continuing to offer preexisting support roles, expanding these roles, or hiring personnel to fill new roles created by grant funds. All the

personnel that are considered providers of student support, have either been exclusive providers of, or contributing providers of one or more of the following categories: student outreach, academic advising, non-academic support, academic support, and career-readiness support.

In Year 3, a survey administered to INTERFACE stakeholders asked questions related to the best practices of INTERFACE. Some examples of the student support services and roles offered during INTERFACE include: intrusive advising for struggling students, academic and career advisor, retention coaches, increased exposure to student support in the classroom was key, and having a dedicated support role for a specific program was extremely beneficial for student retention and learning. For more information, see Figure 15 below.

Figure 15. Student Support Examples



In Year 3, student interviews were conducted to gather feedback on their INTERFACE experience. Most students were pleased with the support they received while enrolled in their program. For example, NWTC students commented that the help from their Academic & Career Advisor and the Academic Coach was valuable for several reasons including class schedules, content understanding, resume development, as well as connecting to outside resources (e.g. veteran and disability services, financial aid). Aside from formalized support, the importance of peer support and teamwork was mentioned by students from four colleges. At LTC, students expressed satisfaction with the instructional assistant and said that the role was an asset to the program. Specifically, the instructional assistant recorded lectures, updated Blackboard, and provided the students with additional resources.

Overall, students reported being satisfied with the training they received. Specifically, students from four colleges indicated pleasure with the amount of applied experience they received. This valuable experience was commonly reported as a key factor to success in their program. Furthermore, these students felt they received up-to-date training that would enable them to find a job after graduating. Regarding tutoring and other student support services (e.g. life coaches, instructional assistants, and peer tutors), students from seven colleges provided positive feedback. When asked about the structure of the programs, students from three colleges found the online components to be helpful in terms of flexibility. For example, students at NATC said the online format allowed them to balance the different aspects of their lives including work, school, and their families.

The feedback about the software and equipment was mixed. Students from two colleges were satisfied with the software and equipment provided to them. For example, Madison students called the equipment “state-of-the-art” and indicated the equipment was a vital component to their success in the program. The students at LTC were provided grant-funded tablets, which they found useful for accessing course content and checking e-mail. However, given the size and power of the tablets, some students were unable to use them for running programs, including Microsoft Office.

Although most feedback was positive, students from several colleges suggested improvements surrounding program format and inconsistent skill levels among students. Specifically, students from one college suggested the revision or elimination of the basic computer literacy courses within the program, as the content was redundant. Regarding technology, students from several colleges suggested equipment updates, such as adding more hard drive space and increasing network storage. Additionally, students from one college suggested the addition of online tutors, which would be a convenient way for students to receive assistance.

#### Participant Assessment

Several colleges have initial assessments of participants’ abilities, skills, and interests. Some of these include, but are not limited to, COMPASS, College Level Examination Program, and ACCUPLACER. If students do not meet some of the scoring requirements, they can take remedial courses before they officially begin the program. Some colleges, such as Madison, hired a student support professional to discuss the interests of prospective students. This allows the support staff to build a relationship with students early, gauge their interest in the program, and increase the likelihood of students utilizing the student support offerings.

Assessment scores are generally used to identify skill gaps and determine which remedial courses or boot camps are offered to students before they enroll in the program. Students are also directed to other resources that can help them diminish gaps in their skills and abilities. NATC uses student assessments in reading and math to create cutoff scores for enrollment. Career guidance is also provided at most of the colleges. Individuals in student support roles either offer career guidance themselves or refer students to their career centers on their respective campuses.

#### **Interim Evaluation Status for Activity 2.2.6: Super Strength**

*Many colleges had programming and curriculum implemented in Year 1 and began training participants. All colleges met the deadline for training participants. Most colleges are exceeding or far exceeding their expected outcomes. Outreach, student support, and career advising work was largely implemented quickly and is proceeding well. The evaluation team will be focusing on understanding participant perspectives in the final two years of the project. We will examine retention, and the impact of student support on retention. We will examine student satisfaction with various facets of INTERFACE programming including digital tutors, work-based learning opportunities, career expos, prior learning assessment, and job outcomes.*

### Final Evaluation Status for Activity 2.2.6: Super Strength

All colleges met deadlines for training participants. The consortium planned to serve 3,058 unique participants. This target was exceeded by over 900 unique participants, with a total of 4,962 unique INTERFACE participants. 13 of the 16 colleges individually exceeded their target number of participants served. Most colleges utilized grant funds to provide students with support related to enrollment, courses/program selection, and career advising. Students had overwhelming positive feedback about their training and the level of student support throughout their academic career.

### Activity 2.2.7: Offer annual IT Career Expos

#### Evaluation Questions for Activity 2.2.7:

- How many career expos were offered at the 16 WTCS colleges?
- To what extent were students satisfied with the career expos?

Very few colleges offered IT-specific career expos. Most colleges utilized existing career fairs to engage IT employers. Colleges also provided students exposure to employers through mock interviews, internships, IT Clubs, internship fairs, Veteran fairs, guest speakers, and on-site tours. BTC hosted an IT career expo where students set up booths and displayed their work to prospective employers. Madison held an IT Fair which brought in 21 local employers and over 200 IT students. MATC created a unique opportunity for students called a Reverse IT Career Fair. For this event, students stationed booths unlike a traditional career fair. In their first fair, 14 students had booths and 27 employers attended. Students gave a presentation about their skillset and work-related experiences and created storyboards to display at their booth. MATC received very positive feedback from employers about the event. Several of the colleges also identified that they were going to invite more IT employers to their future job fairs or hold IT-specific job fairs. Colleges that held IT career fairs mentioned that they found them to be successful.

“The career fairs have been beneficial for our organization because it has allowed us to see the students/candidates and how they interact with others, how genuine they are, and it provides more information than a typical formal interview.”

#### -Employer Feedback

During employer interviews, employers were also asked about their involvement with career expos at the 16 WTCS colleges. Two employers indicated the career expos provided deeper insight of students, two felt career expos gave them the opportunity to educate and market their business to students, and one employer was not aware of career fair opportunities.

In Year 3, a survey was administered to INTERFACE stakeholders regarding project progress. Most respondents felt that their college was on the “right track” in terms of their progress on the development of IT career expos and job fairs.

In Year 3, student interviews were conducted to gather feedback on their INTERFACE experience. Most students were aware of the career fairs/expos being offered at their respective colleges. Students from five colleges thought the career fairs/expos were a good opportunity to network, learn about employers, experience informal interviews, and discover what skills employers are seeking in job applicants. At NATC, the academic advisor attended the career fair to introduce students to employers and recommended students talk to specific employers with jobs available related to their program or location, which the students really appreciated. In addition to being aware of career fairs/expos, students at GTC are informed of clubs, conferences, and competitions. Employers are also invited to attend graduation ceremonies. Although awareness of career fairs/expos was low at Moraine Park Technical College (MPTC), students enjoyed attending the “Why IT?” event

sponsored by MPTC and WCTC. Students at NWTC suggested holding a reverse career fair where employers could visit booths with different students. Additionally, students from several colleges would like to see additional IT employers at the career fairs.

**Interim Evaluation Status for Activity 2.2.7: Opportunity**

*This deliverable has mixed progress across the 16 colleges. Several colleges have held very successful career fairs and IT-specific events to connect students with employers. Others have not focused on this area and students appear to have little opportunity to connect with employers in this format (it should be noted that there are other mechanisms for engaging with employers that colleges may use instead). This activity has been given little attention at a consortium level and colleges have been allowed to implement the deliverable as they see fit. The evaluation team will continue to track the use of career fairs to move students into IT-related jobs.*

**Final Evaluation Status for Activity 2.2.7: Opportunity**

*Colleges connected students to employers using a variety of methods. Several colleges followed the exact objective of this activity and offered IT-specific career expos. Others have added IT-employers to existing career expos within their college. Several colleges have created unique events to connect employers with students such as reverse career fairs where employers visit student booths to learn about their skillset and experiences. Overall, this activity was given little attention at a consortium level and colleges could implement the deliverable as they wanted. Although the specific activity of offering IT-specific career expos was not completed by all colleges, the overarching goal of connecting students to employers was accomplished and had a positive impact on students.*

*Activity 2.2.8: Increase the number of internships and/or work-based learning opportunities*

**Evaluation Questions for Activity 2.2.8:**

- How many internships and work-based learning experiences did students attain across the 16 WTCS colleges?
- To what extent was the implementation of internships/work-based learning aligned with the evidence-based practice?
- To what extent did students feel their internship/work based learning experience prepared them for future professional work/career?

Nine colleges committed to increasing the number of internships and/or work-based learning opportunities in their INTERFACE-funded programs. Fourteen colleges implemented new internships/work-based learning opportunities to programs because of INTERFACE.

One example of a work-based learning opportunity is at NWTC where students were required to take three courses to satisfy the experiential learning requirement. The career experience course can be fulfilled in several ways and focuses on the skill development of students. The career experience course is like a typical internship, but they changed the name of it because they have had numerous experiences with employers who use interns for basic, low-level tasks instead of providing an experience that provides an opportunity for the student to apply their skills and learn more.

An example of a work-based learning opportunity at WCTC is service learning. WCTC requires students to complete a service learning course which includes a project with a local employer. Students work with local non-profit organizations and utilize their IT skills to help the organization solve a problem. This requirement will provide students with an opportunity to help a local organization, improve IT and communication skills, and receive exposure to a real-world work experience.

For many of the students, the internship experience led to full-time employment. Although the majority of student feedback was positive, many also indicated that they were partially dissatisfied with the way internship opportunities were implemented, as some colleges did not have any opportunities lined up at the beginning of the grant. This potentially resulted in leaving the earlier cohorts without adequate work-based opportunities. Another potential shortcoming of the internship model utilized was also reported by students. Specifically, some of those interviewed noted that the internships provide a great experience, but the opportunities are often unpaid, which makes it difficult for students that are already working full-time in addition to going to school.

**Interim Evaluation Status for Activity 2.2.8: Strength**

*Many colleges have worked to expand or enhance their work-based learning opportunities and internships. Development of these is progressing as expected. Several colleges with new programs have not yet had students move through that portion of the program. As more INTERFACE participants engage in internships, the evaluation team will be working to determine the impact on the students and employers. Further, we are more closely examining the unique service learning model at WCTC and will develop a case study to help others understand the model and impacts.*

**Final Evaluation Status for Activity 2.2.8: Strength**

*Work-based learning opportunities and internships provided to INTERFACE students served important educational functions throughout the grant. Students indicated that the applied experiences reinforced classroom materials, improved their confidence in IT, and provided them with professional development opportunities. Not only did these experiences lead to positive educational outcomes, they also resulted in employment. Colleges should continue to build relationships with employers to increase training opportunities for students. This investment from employers will likely lead to a more talented and effective workforce.*

*Activity 2.2.9: Enhance and promote IT Career Pathway Website*

**Evaluation Questions for Activity 2.2.9:**

- In what ways was the Adult Career Pathway website updated?
- To what extent are stakeholders of the website satisfied with the Adult Career Pathways website?
- The two evaluation questions below were not answered. Due to the change in the initiative related to the Career Pathway website, no data was collected to answer the questions.
  - To what extent did website traffic increase after improvements to the Adult Career Pathway website?
  - What do students think about the Adult Career Pathway website?

When the INTERFACE Project was proposed, project leaders planned to build off the website work of TAACCCT Round 2 Making the Future. At that time, the focus was on the [Adult Career Pathway website](#) that was owned by WTCS and built by FVTC. The career pathway website was developed in 2010 by FVTC’s Director of College and Career Pathways and the Director of Learning Innovations. The primary audience was secondary school students.

Using INTERFACE funds awarded to their college, FVTC created the Adult Career Pathways Website Steering Committee, which included representatives from the Bay Area Workforce Development and Fox Valley Workforce Development, to guide the expansion of the website. The website has been greatly expanded and now covers all careers (not only IT), and it aligns well with the Career Pathways focus of the INTERFACE Project. This Career Pathways Website is about career exploration where users can take self-assessments and explore career clusters that align with the assessment results. Employers will also be able to build profiles on the website and disseminate job information to website users.

Project leaders from “Making the Future” (Round 2 Wisconsin TAACCCT Grant) chose to move in a different direction and developed the [Job Up Wisconsin](#) website. This website is intended to be a “one stop shop” for displaced workers to connect them to a broad array of resources including education. INTERFACE Consortium leaders used funds for the ongoing development and support of this website. The INTERFACE Project passed the Job Up website on to the “ACT for Healthcare” (Round 4 Wisconsin TAACCCT Grant). They will continue hosting and managing the website through the end of Round 4.



The [Advance Wisconsin](#) website provides detailed information about each of the Wisconsin TAACCCT projects. This website was developed by “Making the Future”, who transferred ownership and development to the INTERFACE Project. The INTERFACE Project passed the Job Up website on to the “ACT for Healthcare” (Round 4 Wisconsin TAACCCT Grant). They will continue hosting and managing the website through the end of Round 4. The website showcases the TAACCCT projects and the commitment that has been made to “Advance Wisconsin” regarding educational outcomes and employment outcomes to strengthen Wisconsin.

In Year 3, a survey was administered to stakeholders and included questions about the career focused websites. All colleges shared the Job Up Wisconsin website with their workforce development partners. Fifteen of 16 colleges shared the Advance Wisconsin website with their workforce development partners. Colleges expressed feedback that indicated the websites are particularly useful for students interested in learning more about employment and educational opportunities in Wisconsin.

#### **Interim Evaluation Status for Activity 2.2.9: Strength**

*There has been some confusion around this deliverable as several different websites have existed and stakeholders have opposing ideas about the best approach to delivering this information to adult students and displaced workers. Ultimately the deliverable has been met, two websites are now developed and owned by the consortium lead and offer these groups access to the career pathway information. Project leaders will have to determine how to promote the websites and how to sustain them beyond TAACCCT funding. The evaluation team will continue to examine the use and satisfaction with the various websites.*

#### **Final Evaluation Status for Activity 2.2.9: Strength**

*This activity was completed; both career focused websites, [Job Up Wisconsin](#) and [Advance Wisconsin](#) have been developed. Colleges shared the websites with their workforce development partners who found them to be a useful resource when interacting with displaced workers interested in educational and employment opportunities.*

*Activity 2.2.10: Implement system of continuous improvement to review and modify pathways if necessary*

#### **Evaluation Questions for Activity 2.2.10:**

- Was a system of continuous improvement created to review and modify pathways if necessary?
- Was the formative feedback provided by the external evaluator used by WTCS stakeholders?
- To what extent do stakeholders feel the process of continuous improvement was valuable?

Each WTCS college participates in the Quality Review Process (QRP). This model provides metrics for improving individual programs on an annual basis. Some colleges have additional methods they use to ensure programs are meeting goals and curriculum is performing as expected. In Year 2, INTERFACE stakeholders were asked to

respond to the survey question “What is the process that you are using to review and modify INTERFACE-funded programs for continuous improvement?” The most frequent themes were Data Collection Methods and Internal Meetings. Table 6 displays the themes and definitions, frequencies, and sample comments.

Table 6. Continuous Improvement Themes of INTERFACE-Funded Programs

Theme	Definition	Frequency (%)	Examples
<b>Data Collection Methods</b>	Comments regarding the use of data collection methods such as surveys and interviews to modify INTERFACE-funded programs.	8 (4%)	<ul style="list-style-type: none"> <li>• Surveys and data</li> <li>• We continue to interview students and use this feedback to improve.</li> <li>• UW-Stout is assisting with evaluation of the project. Once we have had a group through for a year, and we receive results of the evaluation, we can begin evaluating the program for improvement.</li> </ul>
<b>Internal Meetings</b>	Comments regarding meeting with individuals in their respective college to modify INTERFACE-funded programs.	8 (4%)	<ul style="list-style-type: none"> <li>• We are reviewing our budget and outcomes quarterly as a leadership team. Smaller teams meet monthly to discuss strategies and align our efforts with objectives.</li> <li>• We meet monthly to review activity attainment. Changes are made as appropriate to enable us to meet our outcomes.</li> <li>• Our process includes different editor stages, subject matter expert stages, and team reviews.</li> </ul>
<b>Industry Trends and Needs</b>	Comments regarding industry trends and needs for modifications for INTERFACE-funded programs.	6 (3%)	<ul style="list-style-type: none"> <li>• Employer feedback</li> <li>• Industry connections to continuously refine our courses.</li> <li>• Meetings with stakeholders to assess and adjust as necessary based on performance / outcomes.</li> </ul>
<b>Advisory Board Meetings</b>	Comments regarding meeting with individuals in their advisory board to modify INTERFACE-funded programs.	5 (2%)	<ul style="list-style-type: none"> <li>• We collaborate with our advisory board committee and make modifications according to their needs-based feedback.</li> <li>• We meet with advisory committees on an annual basis and discuss the needs that the employers in our region have.</li> <li>• Review with advisory committee each year.</li> </ul>

The UW-Stout Evaluation Team worked closely with all WTCS colleges. The evaluation team worked especially close with INTERFACE Project Manager, Kathy Spada, at the lead institution (NTC). Site visits to all 16 colleges are conducted bi-annually by the evaluation team. Prior to the site visits the evaluation team provides each college with Data Placemats to improve stakeholder understanding of evaluation results specific to their college. These have been well received by the colleges with some institutions asking for further analysis and graphic representations of their data. Following site visits, each college receives a comprehensive report on key evaluation areas. The reports include suggestions for improvement and next steps for the evaluation.

The INTERFACE Project Manager utilizes the reports generated from the site visits to help prepare for her site visits. This assists with reinforcing the message the evaluation team provided to the colleges. Visual aids have

also been developed to assist stakeholders' understanding of career pathways. The evaluation team created several documents to assist the technical colleges in data reporting. These include a Frequently Asked Questions document, tips and tricks document, templates of data reporting, along with other reporting aids. These have also been well received by the colleges and the evaluation team has noticed that reporting has improved since the creation of these reporting aid documents.

In Year 3, INTERFACE stakeholders were asked if the feedback provided by the evaluation team was valuable. Less than 5% of stakeholders found the evaluation team's feedback not valuable. Stakeholders said the feedback helped better serve students and/or employers. Colleges also described the changes made to ensure the project completed continuous improvement processes. Changes and improvements made during the project included updates to courses and curriculum based on student and instructor feedback, improved approaches to engage prospective students and employer partners, and increased the number of staff to meet the needs of the project and students.

**Interim Evaluation Status for Activity 2.2.10: Strength**

*Colleges have largely relied on existing processes for continuous quality improvement. The evaluation team needs to explore whether the existing process will serve to also ensure that career pathways are appropriately aligned with industry needs. INTERFACE Project Leaders and other college stakeholders have been exceptionally receptive to working with the evaluation team. The team feels that formative feedback has been used by the colleges to improve project implementation.*

**Final Evaluation Status for Activity 2.2.10: Strength**

*Continuous quality improvement was a frequent practice at colleges prior to the beginning of INTERFACE. It was however, a unique experience for colleges to receive the continuous formative feedback from an external grant evaluator. Stakeholders found value in receiving formative feedback and utilized the feedback to make improvements to their project. Colleges also engaged in their existing continuous improvement processes throughout the project to improve their service to students.*

<b>Priority 3: Demonstrate Improved Employment Outcomes (Core Element 5)</b>
Strategy 3.1: Statewide Dissemination of Program Graduate Employment Data
<i>Activity 3.1: Develop a sustainable system for tracking and reporting graduate outcomes for a Wisconsin Employment Scorecard</i>

**Evaluation Questions for Activity 3.1:**

- Was a Wisconsin Employment Scorecard created to track and report graduate outcomes?
- To what extent did all 16 WTCS colleges implement the use of the Scorecard?
- To what extent did each of the partners contribute to the development of the Wisconsin Employment Scorecard?

As the lead institution, NTC implemented the Wisconsin Employment Scorecard according to the original plan. During the grant period, it was announced that the Scorecard was optional for grantees to complete. INTERFACE leadership and stakeholders saw value in the Scorecard and decided to continue the implementation. The consortium worked collaboratively with the system office (WTCS) to develop the scorecard. Colleges are currently deciding the best ways to utilize the Scorecard.

The Scorecard includes five metrics:

1. Employment rate of program graduates
2. Employment retention rate of graduates
3. Median annual salary of program graduates

4. Graduation rate
5. Transfer rate of program graduates

The scorecard tracks student outcomes for all programs, not just INTERFACE-funded programs. Individual college scorecards can be accessed on the WTCS cloud.

*Before TAACCCT...*

- Colleges measured #1 and #3 through graduate follow-up.
- Colleges did not measure #2-Employment retention rate of graduates
- Colleges looked at #4 graduation rate only by college and not by program.
- Colleges did not know their program graduation rates
- Colleges could only see their own transfer data but had nothing to compare it to

*After TAACCCT...*

- Colleges now measure employment retention rate of graduates
- Colleges now have college and program benchmarks for graduation rate and transfer rate
- Scorecard metrics align with College QRP and metrics
- Data is in the cubes stored at the System Office so the Scorecard can be refreshed as needed.

**Interim Evaluation Status for Activity 3.1:** Super Strength

*INTERFACE Project Leadership have made exceptional progress in developing the Employment Scorecard. The first round of data collection was completed in Year 2 as a pilot test. Scorecards will be disseminated to college leadership who can determine how the results will be shared. INTERFACE Project leaders have also met with TAACCCT Round 4 leaders who will continue and expand in this work through the ACT for Healthcare Project.*

**Final Evaluation Status for Activity 3.1:** Super Strength

*The Employment Scorecard was developed and implemented according to projections. INTERFACE Project Leadership collaborated with colleges and WTCS to develop a useful and sustainable scorecard that can be used for all programs at every college. This tool allows colleges to easily determine how their students and programs are performing regarding employment rate, employment retention, salary, graduation rate, and transfer after graduation. WTCS added the scorecard to WTCS Continuous Improvement Data Library as one of the tools that is used as a continuous improvement indicator. The Scorecard will be a valuable resource beyond the INTERFACE Project. All programs can look at the Scorecard and use it to inform decision making.*

## Impact Evaluation

### Propensity Score Matching Background and Selection

The Impact evaluation, led by Dr. Brian Knaeble, used a quasi-experimental design to assess program impacts. The UW-Stout Evaluation team identified comparison groups using propensity score matching. This strategy was designed to model the similarity of an individual to members of the treatment group and was used to estimate the probability of a participant being a beneficiary of treatment, given observable characteristics. Variables used for the matching process include demographics such as age, gender, incumbent worker status, years of schooling, and total credit hours.

Propensity score matching is not a solution for all confounding variables. Unbiased estimates for causal effects are made possible only through an accurate model of treatment assignment. According to Rosenbaum and Rubin, the set of variables for modeling treatment assignment should include “all covariates that are both used to assign treatments and possibly related to the response.”<sup>2</sup> Therefore, the evaluation team strove to obtain adequate data so that such a model was possible, while remaining aware that some variables were not technically classified as covariates. For a detailed explanation of the methods of statistical analysis conducted for this impact evaluation, please see Appendix D.

Treatment is both assigned by college administrators and selected by individuals, making a model of propensity for treatment necessarily complex. However, treatments may be assigned to groups and individuals may independently join groups, in which case a product model is possible.

Further, program participants do not typically enroll at random. As a result, it can be difficult to infer causal effects from analysis of observational data alone. Subject matter knowledge may lead to a model of treatment assignment where the treatment consists of enrollment within the program under study.

It is difficult to ascertain whether such a model can be used during implementation of propensity score methodology, since to be valid, such methodology must be carried out under the assumption of strongly ignorable treatment assignment. In other words, there is substantial uncertainty due to inherently complex situations and models. As a result, it is important for evaluators to check their assumption of strongly ignorable treatment assignment. Therefore, the model of treatment assignment and the estimator for propensity were constructed to accurately reflect the decision processes of students and administrators based on information obtained throughout the implementation evaluation.

The comparison sample is comprised of a stratified random sample of WTCS students, excluding the INTERFACE-funded programs and attempts to provide an accurate reflection of the variations and diversity within that population. The model of treatment assignment compared INTERFACE participant outcomes to non-INTERFACE participant outcomes. This allows consortium stakeholders to draw inferences about program effectiveness.

### Impact Evaluation Methods

The INTERFACE Project is considered an intervention (a set of treatments) on the population of students enrolled at WTCS colleges between October 2013 and March 2017. Treatment consists of any direct impact of

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<sup>2</sup> Rosenbaum, P., & Rubin, D. (1983). The central role of the propensity score in observational studies for causal effects. *Biometrika*, 70(1), 41-55.

INTERFACE funds on a student. Over the four-year grant period, the evaluation team collected quantitative data, including academic, wage, and employment data from the colleges and WTCS to measure the impacts of INTERFACE.

The causal effect of treatment was defined as the difference between a students' eventual outcome and the outcome that student would have obtained had the intervention not occurred. Since the hypothetical outcome is counterfactual, students were matched based on covariate data where similar untreated students and outcomes were compared. This difference in outcomes was averaged over the population of all treated students and the result described as the treatment effect on the treated. This analysis was done separately for each outcome.

Background covariate data consisted of race, age, gender, highest prior credential earned, disability status, and economic disadvantaged status. Program category is determined from a student's program of study categorized into one of eight categories.

#### **Program Categories**

- Agriculture
- Business
- Graphics
- Family & Consumer Education
- Industrial
- Service & Health
- Technical & Television
- General Education

The studied outcomes of the INTERFACE Project were:

- Pass Rates (completed credits divided by attempted credits)
- Retention Rates
- Graduation Rates
- Employment Rates (amongst students who were non-incumbent workers)
- Wages (increases amongst students who were incumbent workers)

Incumbent workers are defined as students who were employed at the time of enrollment. Non-incumbent workers are defined as students who were not employed at the time of enrollment. Students were matched on covariates (see list below).

- Ethnicity
- Gender
- Disability Status
- Age
- Hometown Regional Economics
- College Attended
- Program of Study
- Economically Disadvantaged Status
- Enrollment Year
- Graduation Year
- Past Credentials Earned
- Employer Involvement in INTERFACE
- TAA Status
- Location Propensity
- Program Propensity
- IT Propensity

Note that location propensity, program propensity, and IT propensity were used within the model of treatment propensity. For example, an individual's treatment propensity was conditional based on their IT propensity. Specifically, it was anticipated that treated students would have a higher IT propensity than non-treated students. Binary educational outcomes included program completion, program retention (based on credits attempted), and further education. Pass rate was an educational outcome defined as the number of credits

earned divided by the number of credits attempted. Binary employment variables included employment upon graduation and employment retention for six months. Wage was an employment variable defined as post-graduation wage minus pre-enrollment wage. Awareness of funding was a binary variable defined as blind (no tuition waiver available for students) or unblind (tuition waiver was offered to students) to treatment. All students enrolled in a specific college were assigned a blind or unblind status.

Based on the available data, the studied populations differed slightly depending on the outcome under study. Academic data was available for the entire duration of the grant period. Wage and employment data was collected once during the grant period (November 2016) due to the timeline of INTERFACE and system data timelines. The collected data was used to assess the impact across multiple outcomes, thus questions were answered using data specific to academic years and available wage and employment data. For each outcome, the attention to a subpopulation was restricted and a comparison control group was selected to avoid confounding. For each outcome, individuals who were missing data were dropped from the analysis. Pass rate and wage increase was a linear model, while logistic regression was used for all other outcomes and for modeling propensity. When matching on propensity or covariates, nearest neighbor matching was used with the *MatchIt* package in R. Checks and balances were done after matching, to assure that confounds had not influenced the pairing. For example, program of study was considered the impactful confound and was sufficiently balanced after matching. There was only a slight difference in balance between propensity score matched samples and samples matched using all available covariates. For each outcome, treatment effect estimates are stated as unadjusted, adjusted with regression, adjusted via propensity score matching and regression, and adjusted via covariate matching and regression. The untreated sample is vastly larger than the treated sample. Matching reduces the size of the untreated sample. With a small sample size, the null cannot be rejected given a sufficiently small p value, nor can the null be accepted. A small sample size typically implies inadequate power; therefore, accepting the null comes with the risk of committing a type 2 error. The matched analyses use smaller sample sizes to be able to accept or reject the null and to uncover the hidden natural experiment.

### **Impact Evaluation Results**

The impact of the INTERFACE Project was studied on 5 primary outcomes: Pass Rate, Retention, Graduation Rate, Employment Rate (for participants who were unemployed at enrollment), and Wages (for participants who were employed at enrollment).

#### **Pass Rate**

**A significant positive effect of treatment on pass rates was observed.** Pass rates, defined as completed credits divided by attempted credits for each student, was studied on the entire population. There were 65,115 students with complete data, 4,514 of which were treated and 60,601 of which were untreated. **The mean pass rate for the treated students was 72.4%. The mean pass rate for the untreated students was 72.2%.**

Results were also significantly positive with slightly smaller magnitude after dropping 1,018 treated students who were unblind to treatment. Unblind students were dropped to determine if the availability of a tuition waiver had an impact on pass rate. Overall, it was calculated that the treatment caused treated students to earn an additional 2,128 credits compared to untreated students. It amounts to about an extra half credit earned per treated student. In summary, it is estimated that treatment caused treated students to earn a statistically significant half credit more than they would have otherwise, on average.

## Retention

**An insignificant effect of treatment on retention was observed.** Retention was defined as a student attempting credits one year after their first enrollment. Retention was studied on the population of students who attempted credits during the 2014-2015 school year, excluding graduates. Of the 11,876 students studied, 1,810 were treated and 10,066 were untreated. **The retention rate for the treated was 67%. The retention rate for the untreated was 67%.**

Results were similarly insignificant after dropping 323 unblinded treated students. Unblinded students were dropped to determine if the availability of a tuition waiver had an impact on pass rate. If we drop the blinded treated students and keep the unblinded treated students, then, the treatment, as applied to those 4,514 individuals, could be responsible for about an additional 135 retained students. Also, results were insignificant after dropping 1,953 students enrolled in non-associate degree programs. Students enrolled in certificates or technical diplomas were dropped to look at retention differences for associate degrees. In summary, it is estimated that treatment prevented 135 dropouts amongst the treated students, but this estimate was not statistically significant.

## Graduation Rate

**A significant positive effect of treatment on graduation was observed.** Graduation, defined as the completion of any program of study, was studied on the entire population. There were 65,115 students with complete data, 4,514 of which were treated and 60,601 of which were untreated. **The graduation rate for the treated was 35%. The graduation rate for the untreated was 20%.**

In summary, it is estimated that 1,011 treated students graduated because of treatment (they would not have graduated otherwise), which is statistically significant.

## Employment Rate

**A significant positive effect of treatment on employment was observed.** Employment was defined as having a recorded wage. Students who were non-incumbent workers that attempted credits in 2014-2015 were studied to determine if they had a recorded wage in 2015-2016. There were 1,131 students with complete data, 55 of which were treated and 1076 of which were untreated. **The employment rate for the treated was 93%. The employment rate for the untreated was 76%.**

In summary, 1,068 treated individuals obtained employment because of the treatment and would not have obtained employment otherwise. This estimate only applies to the students who were non-incumbent workers and is statistically significant.

## Wages

**An insignificant effect of treatment on wage increase was observed.** Wage increase was defined as a student's wage during 2016 minus their wage in 2015. Students who were incumbent workers (as evidenced by a positive wage during 2015) who attempted credits during the 2014-2015 school year were studied. Of the 29,632 students studied 912 were treated and 28,720 were untreated. **The average wage increase for the treated was \$4,224. The average wage increase for the untreated was \$4,660. The difference of these averages was -\$442.**

Results were similarly insignificant after 185 treated and unblinded students were dropped. Using the propensity score matched estimated difference of \$308, we estimate that treatment as applied to the 4,514 individuals who were treated caused an additional \$1,390,312 in increased earnings. This estimate is not significantly different from zero. Due to consistently (statistically) insignificant findings across multiple models, with sufficient sample

sizes, there is likely no effect of treatment on wage increase.

Wages generally increased across quarters. Due to missing data, only students with complete data for the eight quarters of 2015 and 2016 were included. Starting first quarter 2015 and ending fourth quarter 2016 the average wages were \$5,829, \$6,239, \$5,803, \$5,955, \$6,608, \$7,155, \$6,813, and \$7,240. The proportion of the 334,435 students whose final wages were higher than their beginning wages was 73% (significantly different from 50%,  $p < .001$ ).

In a study of 38,223 students (including treated and untreated), who attempted credits during the 2014-2015 school year, it was estimated, via multiple regression, that students who were incumbent workers ( $n = 29,632$ ), on average increased their salary by \$1,668 more than non-incumbent workers ( $n = 8,591$ ,  $p < .001$ ).

On the population of students who were incumbent workers ( $n = 29,632$ ), a multiple regression of wage increase on treatment, covariates, and an indicator of eventual program completion, produced an estimate that completion boosts the wage increase by \$5,728 ( $p < .001$ ). In short, students who were incumbent workers and completed a credential earned higher wages than incumbent workers who did not complete a credential.

Differences were found in wages when comparing treated and untreated students based on incumbent worker status. **Incumbent workers from a treated program earned less wages (\$1,694 less, on average per student,  $p < .001$ ) than incumbent workers from an untreated program.**

In summary, there was no evidence of an effect of treatment on wages for treated students who were incumbent workers.

Table 7. Outcome Summaries

Outcome	Causal Estimate	Impact (on the treated)
Pass Rate	2.5% increase	An extra 0.5 credit per student
Retention*	3% increase	135 students retained or dropouts prevented
Graduate	112% increase	1,011 extra graduations
Employment (non-incumbents)	31% increase	1,068 extra jobs
Wages (incumbents)	Likely zero	No evidence for an increase

\*Effect likely restricted only to the unblinded students

### Time to Degree

There was a population of 4,832 students who first attempted credits during the 2015-2016 school year and earned a Technical Diploma or Certificate. For this ancillary analysis, students beginning in 2015-2016 were unable to earn an Associate Degree by the end of INTERFACE data collection. Of the 638 treated students, 75% earned a technical diploma or certificate during the 2015-2016 school year. Amongst the 4,194 untreated students, 69% earned a technical diploma or certificate during the 2015-2016 school year. The difference was statistically significant ( $p < .001$ ). **There is weak evidence that treatment improves time to degree.** This may be a result of INTERFACE’s stacked and latticed credential pathway approach, which offered treated participants more credential earning opportunities. Untreated programs may have not used the stacked and latticed pathway approach, thus possibly limiting access to short-term credentials for untreated students.

## Completion by Demographics

The demographic makeup (race, age, gender, prior credentials, disability, and economic status) of students varied between the completer and non-completer groups (completer is defined as someone who earned a credential). There is a significant difference for each of the following comparisons:

- Graduates who are Black (4%) and non-graduates who are Black (6%)
- Graduates who are American Indian (0.5%) and non-graduates who are American Indian (1%)
- Completers are slightly older (M = 32 years) than non-completers (M = 30 years)
- More female completers (29%) than female non-completers (25%)
- Completers are somewhat more likely to have prior credentials (roughly 3%) than non-completers (roughly 1%)
- Presence of disability was lower amongst completers (8%) than non-completers (12%)
- Presence of economic disadvantage was higher amongst the completers (64%) than the non-completers (57%)

## Traditional IT Programs

FVTC, LTC, Mid-State Technical College (MSTC), SWTC, and WTC did not spend funds on traditional IT programs. Thus, they were excluded from secondary analyses on graduation rates, employment, and wage increases. After excluding these colleges, the estimate for graduation rate increased and became more significant for treated students in comparison to untreated students. In addition, employment estimates increased for the treated students, but the matching estimates both became statistically insignificant due to the few treated students (N = 43) in the sample. **Interestingly, pass rates became insignificant for students in traditional IT programs; however, students' pass rates in non-traditional IT programs remain significant and increase in magnitude.** Finally, wage increase estimates remained insignificant regardless of being traditional or non-traditional IT.

## Blind vs. Unblind Students

Some secondary analyses conditioned on whether treated students were blind (no tuition waiver available for students) or unblind (tuition waiver available for students) to treatment. Specifically, students who were unblind to treatment received tuition waivers.

The positive effects of treatment were sometimes weakened after restricting the population to include only students blind to treatment (no tuition waiver available). **When using a multiple regression and restricting to only blinded students, four outcomes decreased (pass rate, retention rate, employment rate, and wages), one outcome increased (graduation rate).** This may suggest that some of the positive effects of treatment could be due to more motivation amongst students who actively seek out treatment. Also, unblinded students had their tuition paid through the grant, which may also attribute to the attenuation. However, there are several variables that impact an individual's decision to enroll in a program and no direct causations can be drawn from this data.

## Limitations of Impact Evaluation

This evaluation had limitations related to the availability of data and timeline for reporting data at multiple levels (USDOL, State, College). The evaluation team was limited in access to wage and employment data. The WTCS only pulled wage and employment data in November, once a year. As of Year 2, there were very few completers and exiters; therefore, wage and employment data was only pulled in November of 2016 and 2017.

The evaluation would yield more accurate and informative results if tracking was extended 1-2 years beyond the period of performance. Many participants are continuing to complete credentials and not all completers and exiters have had ample time to secure employment. By extending participant tracking after the period of performance, more accurate conclusions could be drawn about the grant impact on wage and employment.

Throughout the INTERFACE Project there have been several deliverables and important Impact Evaluation outcomes to note. The table below addresses the research questions asked and the corresponding results from the project.

Table 8. Impact Evaluation Research Questions & Results

Research Questions		Results
INTERFACE Project Outcomes	Did the INTERFACE Project interventions have a significantly positive effect on students who received the training program(s) as compared with students who did not?	<ul style="list-style-type: none"> <li>• Yes: Pass Rates, Graduation Rates, Employment Rates</li> <li>• Uncertain: Retention Rates</li> <li>• Unlikely: Wage Increase</li> </ul>
	Did students who participated in grant-funded courses persist and complete credential programs at higher rates than a comparison group of those that did not?	<ul style="list-style-type: none"> <li>• An estimated 1,011 grant funded students graduated that would not have without grant funds.</li> </ul>
	Did the students fare better in terms of finding and keeping jobs? And as compared to their previous employment attempts prior to the intervention?	<ul style="list-style-type: none"> <li>• Unable to draw clear consensus due to unavailable data on continued employment for grant-funded students.</li> </ul>
	Did the students achieve higher earnings once they found a job, as compared to their previous employment record?	<ul style="list-style-type: none"> <li>• Unable to draw clear consensus due to unavailable data on previous employment and wage data for grant-funded students.</li> </ul>
	To what degree were graduates of grant-funded programs viewed as more employable than students in a comparison group?	<ul style="list-style-type: none"> <li>• Employers mentioned students had better soft skill development and better real-world knowledge of course content.</li> </ul>
	To what degree did workers gain a greater ability to earn a living wage than workers in a comparison group?	<ul style="list-style-type: none"> <li>• Allowed grant-funded students a greater probability of finding work.</li> </ul>
	To what extent did Job Centers and Colleges align the classes they offer?	<ul style="list-style-type: none"> <li>• Colleges worked with their regional workforce partners to develop course competencies.</li> <li>• Workforce partners also utilized online BITS modules early to gain feedback on their utility.</li> </ul>
	To what extent was there greater coordination among agencies providing services to TAA, Veterans, and adult learners?	<ul style="list-style-type: none"> <li>• BU resource available on NTC campus</li> <li>• Improved collaboration with job centers</li> <li>• Development of VET-IT</li> </ul>
	Did students participating in grant-funded programs have an increased opportunity to earn industry-recognized credentials than students in a comparison group?	<ul style="list-style-type: none"> <li>• Colleges worked with area businesses to ensure industry-recognized credential alignment.</li> </ul>
	Did students participating in grant-funded programs have an increased opportunity to complete the program(s) in less time than students in a comparison group?	<ul style="list-style-type: none"> <li>• This outcome is uncertain, there is weak evidence that grant-funds improved time to completion.</li> </ul>
	To what extent did each of the colleges increase IT credentials that have value in the local workforce?	<ul style="list-style-type: none"> <li>• Developed 80 new industry aligned credentials</li> <li>• 148 new or updated courses</li> </ul>

Research Questions		Results
	Did students participating in a grant-funded program gain proficiency in valuable IT/computer skills as compared with students who did not?	<ul style="list-style-type: none"> <li>Data was not collected to specifically answer this question.</li> <li>All INTERFACE-funded programs were aligned with industry standards and developed using evidence-based design.</li> </ul>
	Did enrollment in IT programs and certificates increase among WTCS colleges?	<ul style="list-style-type: none"> <li>Unable to draw clear consensus due to unavailable data on previous student enrollment</li> </ul>
INTERFACE Project Deliverables	Were there Bi-Annual Statewide and Regional Collaborative Planning Meetings held?	<ul style="list-style-type: none"> <li>Regional collaborative planning is a long-term goal for WTCS. Relationships continue to be built and strengthened.</li> </ul>
	Was an Annual Sector Strategy Workshop offered in Year 2 and 3?	<ul style="list-style-type: none"> <li>This work was done continually throughout the life of the grant. College wide bi-annual meetings were held to update the consortium on best practices on various topics such as; employer engagement, partnership building, effective industry analysis, and the design of industry-relevant training programs.</li> <li>Key presenters were brought in to share their experience and best practices.</li> <li>The bi-annual meetings also enhanced collaboration with colleges that may not be able to meet with one another based on geographical location.</li> </ul>
	Did each of the colleges offer a Standardized Basic Computer Literacy Course?	<ul style="list-style-type: none"> <li>Stakeholders from across the consortium developed the competencies for the BITS course. FVTC led the development of the course. Upon completion, the course was uploaded to the online repository as a massive online open course so that all colleges could use the course. The computer literacy course is the most downloaded course on Skills Commons.</li> <li>Also, developers have designed a “train the trainers” program that helps train partners in how to implement and use the course, and it has been used in a variety of venues outside of the WTCS (e.g. prisons, job centers, libraries).</li> </ul>
	Did each consortium member implement 1-3 PLA strategies?	<ul style="list-style-type: none"> <li>94% of stakeholders accomplished their goals of implementing PLA strategies</li> </ul>
	Were 375 Mobile Apps developed and/or customized?	<ul style="list-style-type: none"> <li>In total, 454 digital tutors were developed.</li> </ul>
	Was an online repository of IT Mobile Apps created to allow for broad dissemination?	<ul style="list-style-type: none"> <li>All course materials have been uploaded to an online repository via SkillsCommons for broad dissemination.</li> </ul>
	Were two new Associate Degrees developed?	<ul style="list-style-type: none"> <li>In total, 10 Associate Degrees were developed through the course of the INTERFACE project.</li> </ul>
Were up to nine new certificates developed?	<ul style="list-style-type: none"> <li>In total, 25 certificates were developed through the course of the INTERFACE project.</li> </ul>	

Research Questions		Results
Were up to three general education courses with IT specific content developed?	<ul style="list-style-type: none"> <li>• A total of 5 general education courses were developed through the course of the INTERFACE project.</li> </ul>	
Were at least ten new courses developed?	<ul style="list-style-type: none"> <li>• In total, 148 courses were developed over the course of the INTERFACE project.</li> </ul>	
Did all 16 colleges establish industry driven road maps/pathways to IT and related careers?	<ul style="list-style-type: none"> <li>• Industry driven road maps/pathways were established at all colleges.</li> </ul>	
Did all 16 colleges create IT related articulation agreements with Bellevue University?	<ul style="list-style-type: none"> <li>• All consortium colleges developed articulation agreements with Bellevue University.</li> </ul>	
Did all 16 colleges offer IT Career Expos annually?	<ul style="list-style-type: none"> <li>• Several colleges created IT-specific career expos while the majority added more of an IT focus to their pre-existing career fairs.</li> </ul>	
Was the Adult Career Pathway website enhanced to meet stakeholders' expectations?	<ul style="list-style-type: none"> <li>• Two websites were successfully created and workforce partners found them to be a useful resource when interacting with displaced workers.</li> </ul>	
Was a Wisconsin Employment Results Scorecard developed?	<ul style="list-style-type: none"> <li>• INTERFACE Project Leadership and WTCS collaborated to develop a useful and sustainable scorecard.</li> </ul>	

## Promising Approaches & Innovations

- **Alternative Course Delivery**
  - Many colleges have found unique ways to best serve the population of students in their region. Online and blended course delivery, virtual labs, off-campus classrooms, & non-traditional class times were used to better serve adult learners.
- **Integrated Student Support**
  - Most colleges have used INTERFACE funds to provide additional student support at the program level. Each college reported a positive effect, resulting from both academic and non-academic student support. Some colleges modified the student support roles as the needs of students changed. Some colleges found ways to sustain their student support roles beyond the grant.
- **Tuition Waivers**
  - Three colleges successfully used tuition waivers to recruit students to new programs. Students seem aware that their education was made possible by the INTERFACE Project. All colleges are sustaining the programs developed with grant funds; however, some colleges will be modifying the way in which programs are offered.
- **Student Recognition**
  - Several colleges have used informal “graduation” ceremonies after completion of a certificate as a method for boosting student confidence. Family support at these events is critical to improving student outcomes. Employer involvement has resulted in networking and work-based opportunities for students.
- **Continuous Process Improvement**
  - One college used a yearly program development process that should be viewed as a best practice. The use of key indicators and data by faculty and staff at the program level fosters a cycle of continuous improvement which serves to ensure curriculum stays up to date.
- **BITS Course Development and Use**
  - The BITS Course was successfully implemented in a way that met the needs of learners across the world. Colleges disseminated the BITS materials in workforce development agencies, libraries, colleges, senior centers, and even county jails and prisons.
- **Recruitment**
  - Recruitment and outreach efforts have been best practices. Some colleges have worked with workforce development partners to recruit students. One college uses short IT Academies to allow students to experience IT through guest speakers, tours, and a project where they can do some IT work. This helps students see the possibilities of what they can do.
- **Internships**
  - Colleges have worked with employers to create stronger IT Internships. One college has held two successful IT Internship Fairs. They had strong participation from students and employers. Another college created an IT Internship website.
- **Consortium Collaboration**
  - INTERFACE Leadership facilitated bi-annual meetings throughout the project. The 1-2-day meetings were held in the Fall and Spring and offered an opportunity for project teams to share successes/challenges, disseminate information, and learn from others. Monthly web/phone conferences were held to keep the consortium up to date on valuable information.

## Challenges

- **Budget Modifications**
  - Nearly every college reported delays because of budget approval and modifications. For most colleges delays had minimal long-term impact and project deadlines were met.
- **Hiring Delays**
  - Hiring delays were in many cases related to budget delays, however some colleges had difficulty finding and/or retaining qualified instructors. The need to have instructors involved in the program development process presented challenges.
- **Employer Engagement**
  - The timing of employer involvement and maintaining employer engagement presented challenges for several colleges. The delay between program proposal and program implementation contributed to a lack of employer interest once the program was available.
- **Strained Relationship with Workforce Development Agencies**
  - Relationship building and engagement with external workforce development partners was challenging for some colleges. Colleges mentioned that strained relationships with workforce development has inhibited the opportunity to take advantage of a natural pipeline for recruiting students.
- **Time Constraints**
  - Colleges regularly report that faculty and others involved in program development are challenged to find time to devote to INTERFACE. However, most colleges indicated that their dedicated staff found ways to complete the work in the designated time frame.
- **Changing Technology**
  - When asked about challenges, most colleges cited the fact that technology is constantly changing within the IT field. This is a challenge they have accepted as reality, but one that takes consistent effort to manage.
- **Student Participation**
  - Colleges indicated that it was challenging to get students engaged in events regardless of the time spent in marketing efforts. Students that did attend the events though, found value in attending. For example, several students indicated that they got job interviews from attending career fairs.

## Outcome Evaluation

In addition to the evaluation of the activities related to the priorities and strategies, the evaluation team gathered data from the 16 colleges on the nine outcome measures. The evaluation liaison at each college was responsible for reporting this data. To ensure accurate reporting, the evaluation team provided colleges with guidance in the form of webinars, standard documentation and templates, phone support, and quality checklists. The consortium exceeded some/most/all targets for all nine outcome measures (see Table 9 & 10). Data was last updated on July 14, 2017.

Table 9. Annual Performance Reporting Outcomes

Outcome Measures		Total Results
1	Percentage of participants completing a program to date:	33%
2	Percentage of participants currently retained in a TAACCCT program:	34%
3	Percentage of participants either completing a program to date or currently retained in a TAACCCT program:	66%
4	Percentage of completers earning a certificate of less than one year to date:	89%
5	Percentage of completers earning a certificate of more than one year to date:	7%
6	Percentage of completers earning a degree to date:	33%
7	Average number of certificates/degrees per participant:	0.5
8	Average number of credit hours completed per participant:	13
9	Percentage of participants earning credit hours within a certain year:	Y1: 34% Y2: 63% Y3: 90% Y4: 65%
10	Percentage of non-incumbent worker completers entering employment:	5%
11	Percentage of those entering employment who retain employment for at least two quarters:	30%
12	Percentage of completers entering further education:	0.5%
13	Percentage of completers either entering further education or entering employment:	3%
14	Percentage of incumbent workers receiving a wage increase:	52%

Table 10. INTERFACE Outcome Measures

	Year 1	Year 2	Year 3	Year 4	Total
<b>#1: Total Unique Participants Served</b>	P 534	P 1,263	P 1,261	P 0	P 3,058
	A 1,485	A 1,709	A 1,475	A 293	A 4,962
	% 278%	% 135%	% 117%	% 100%	% 162%
<b>#2: Total Number of Participants Completing a TAACCCT-Funded Program of Study</b>	P 201	P 646	P 782	P 0	P 1,629
	A 80	A 619	A 655	A 261	A 1,615
	% 40%	% 96%	% 84%	% 100%	% 99%
<b>#3: Total Number of Participants Still Retained in Their Program of Study</b>	P 256	P 560	P 674	P 0	P 1,490
	A 1,257	A 1,998	A 2,121	A 1,663	A 7,039
	% 491%	% 357%	% 315%	% 100%	% 472%
<b>#4: Total Number of Participants Completing Credit Hours</b>	P 473	P 1,171	P 1,284	P 0	P 2,928
	A 502	A 1,877	A 2,384	A 1,502	A 6,265
	% 106%	% 160%	% 186%	% 100%	% 214%
<b>#5: Total Number of Participants Earning Credentials</b>	P 201	P 661	P 811	P 0	P 1,673
	A 86	A 700	A 905	A 397	A 2,088
	% 43%	% 106%	% 112%	% 100%	% 125%
<b>#6: Total Number of Participants Enrolled in Further Education After TAACCCT-funded Program of Study Completion</b>	P 66	P 186	P 258	P 81	P 591
	A 1	A 2	A 5	A 0	A 8
	% 2%	% 1%	% 2%	% 0%	% 1%
<b>#7: Total Number of Participants Employed After TAACCCT-funded Program of Study Completion</b>	P 40	P 304	P 542	P 383	P 1,269
	A 0	A 5	A 28	A 0	A 33
	% 0%	% 2%	% 5%	% 0%	% 3%
<b>#8: Total Number of Participants Retained in Employment After Program of Study Completion</b>	P 40	P 204	P 455	P 404	P 1,103
	A 0	A 3	A 7	A 0	A 10
	% 0%	% 2%	% 2%	% 0%	% 1%
<b>#9: Total Number of Those Participants Employed at Enrollment Who Received a Wage Increase Post-Enrollment</b>	P 35	P 226	P 333	P 223	P 817
	A 63	A 525	A 688	A 51	A 1,327
	% 180%	% 232%	% 207%	% 23%	% 162%

P = Projected; A = Actual; % = % of Projected

Projection Exceeded	Projection Almost Met	Projection Unmet
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## Summary

The implementation evaluation plan aligns with the priorities, strategies, and activities developed by INTERFACE leadership to accomplish the goals of the TAACCCT program (as written in the Project Narrative submitted to USDOL). Table 11 presents summary of the findings of the evaluation team for each activity.

For each activity, the evaluation team has provided evaluation findings (right column) which is a subjective measure of progress for each area. **These ratings are meant to provide summative feedback to consortium leadership and evaluates the quality of work done in each activity.** For the purposes of this report we have adopted the rating system utilized by the Higher Learning Commission’s AQIP Portfolio System.

Rating	Interpretation
<b>Super Strength</b>	Activities were seen as a best practice or goals were exceeded
<b>Strength</b>	Consortium met goals as planned
<b>Opportunity</b>	Significant work was accomplished, but goals were not fully met as planned
<b>Outstanding Opportunity</b>	Goals were not met as planned

Table 11. Evaluation Findings Summary

Priority 1: Increase attainment of IT Certifications, Certificates, Diplomas, and Other Industry-Recognized Credentials for Target Populations in Growth Industry Sectors (Core Element 1, 2, 5, & 6)				
Strategy 1.1: Strategic Alignment (Core Element 5)				
Activities		Methodology	Deliverables	Evaluation Findings
<b>Activity 1.1.1</b>	Establish a framework for aligning regional/state initiatives that consists of a Wisconsin Team that has representation from five Regional Collaborative Planning Teams	<ul style="list-style-type: none"> <li>Tracking of statewide and regional meetings and annual workshops</li> <li>Participant observation of meetings</li> <li>Satisfaction survey</li> </ul>	<ul style="list-style-type: none"> <li>Bi-Annual Statewide and Regional Collaborative Planning Team Meetings</li> <li>Annual Sector Strategy Workshop (Year 2 and Year 3)</li> </ul>	Interim: Opportunity Final: Opportunity ( <a href="#">See page 23</a> )
<b>Activity 1.1.2</b>	Research and adopt statewide baseline core competencies for a standardized computer literacy course	<ul style="list-style-type: none"> <li>Tracking of course offerings</li> <li>Participant observation of meetings</li> <li>Track student performance in Basic Computer Literacy Course</li> <li>WDB/Employer survey</li> </ul>	<ul style="list-style-type: none"> <li>Standardized Basic Computer Literacy Course Offered in each College District</li> </ul>	Interim: Super Strength Final: Super Strength ( <a href="#">See page 24</a> )

**Strategy 1.2: Establish statewide systematic framework for PLA in IT and Related Careers (Core Elements 1, 2 & 6)**

Activities		Methodology	Deliverables	Evaluation Findings
<b>Activity 1.2.1</b>	Consortium Colleges will participate in professional development training sessions offered by Wisconsin’s <i>Making the Future</i> (Round 2 TAACCCT) focused on implementing PLA	<ul style="list-style-type: none"> <li>Tracking of the professional development training sessions</li> <li>Tracking of PLA strategies implemented across the consortium</li> <li>Tracking of student performance</li> <li>Post professional development satisfaction survey</li> <li>Overall professional development satisfaction survey</li> </ul>	<ul style="list-style-type: none"> <li>Each consortium member implements 1-3 PLA strategies</li> </ul>	Interim: Opportunity Final: Opportunity <a href="#">(See page 26)</a>
<b>Activity 1.2.2</b>	All colleges will commit to implementing at least 1-3 recommendations in their grant funded programs pathway			

**Priority 2: Introduce or Replicate Innovative and Effective Methods for Curriculum Development and Delivery to Improve Learning Outcomes to Address Industry Needs (Core Elements 1, 2, 4, & 6)**

**Strategy 2.1: Online and Technology-Enabled Supplemental Learning (Core Element 4 & 6)**

Activities		Methodology	Deliverables	Evaluation Findings
<b>Activity 2.1.1</b>	Develop the processes to build, store, pilot, and use project-related Mobile Applications for the 16 consortium members’ programs of study	<ul style="list-style-type: none"> <li>Tracking of processes developed</li> <li>Interviews with key users/implementers</li> <li>Satisfaction survey of Mobile Apps experience</li> <li>Track performance of Mobile App class (pre/post)</li> </ul>	<ul style="list-style-type: none"> <li>375 Mobile Apps developed and/or customized</li> <li>On-line repository of IT Mobile Apps available for broad dissemination</li> </ul>	Interim: Super Strength Final: Super Strength <a href="#">(See page 28)</a>

**Strategy 2.2: Implement Industry-Driven Road Maps/Adult Career Pathways in IT and Related Careers (Core Elements 1, 2, & 4)**

Activities		Methodology	Deliverables	Evaluation Findings
<b>Activity 2.2.1</b>	Develop, modify, contextualize, or chunk curriculum based on program and pathway using the Worldwide Instructional Design System	<ul style="list-style-type: none"> <li>Satisfaction survey for curriculum staff</li> <li>Satisfaction survey for WIDS staff</li> <li>Track fidelity to timeline</li> </ul>	<ul style="list-style-type: none"> <li>Two new Associate Degree programs</li> <li>Up to nine new certificates will be developed</li> <li>Up to three general education courses will be contextualized with IT specific content</li> <li>At least 10 new courses will be developed</li> <li>16 colleges have established industry-driven road maps/pathways to IT and related careers</li> </ul>	Interim: Super Strength Final: Super Strength <a href="#">(See page 39)</a>
<b>Activity 2.2.2</b>	Develop natural entry/ exit points to and from employment	<ul style="list-style-type: none"> <li>Track the number of entry/exit points created</li> <li>Employer satisfaction survey</li> <li>WDB satisfaction survey</li> </ul>		
<b>Activity 2.2.3</b>	Organize curriculum, as possible, into stackable and/or latticeable industry recognized credentials that are portable and/or transferable	<ul style="list-style-type: none"> <li>Track curriculum that has been newly organized into industry credentials</li> <li>Track fidelity to timeline</li> </ul>		
<b>Activity 2.2.4</b>	Continue to work with UW schools, as well as other 4-year institutions to ensure curriculum transferability and program articulation	<ul style="list-style-type: none"> <li>Interview articulation discussion participants</li> <li>Track number of articulation agreements developed and discussions</li> </ul>	<ul style="list-style-type: none"> <li>IT related articulation agreement in place between all 16 colleges and Bellevue University</li> </ul>	Interim: Strength Final: Strength <a href="#">(See page 40)</a>
<b>Activity 2.2.5</b>	Develop articulation agreement with Bellevue University in Nebraska			
<b>Activity 2.2.6</b>	Train participants	<ul style="list-style-type: none"> <li>Student satisfaction survey</li> <li>Focus Groups</li> </ul>		Interim: Super Strength Final: Super Strength <a href="#">(See page 45)</a>

Activities		Methodology	Deliverables	Evaluation Findings
<b>Activity 2.2.7</b>	Offer annual IT Career Expos	<ul style="list-style-type: none"> <li>Track number of IT Career Expos offered</li> <li>Career Expo satisfaction survey</li> </ul>	<ul style="list-style-type: none"> <li>IT Career Expos offered annually in each district</li> </ul>	Interim: Opportunity Final: Opportunity ( <a href="#">See page 47</a> )
<b>Activity 2.2.8</b>	Increase the number of internships and/or work-based learning opportunities	<ul style="list-style-type: none"> <li>Track number of internships and work-based learning opportunities</li> <li>Employer satisfaction survey</li> </ul>		Interim: Strength Final: Strength ( <a href="#">See page 48</a> )
<b>Activity 2.2.9</b>	Enhance and promote IT Career Pathway Website	<ul style="list-style-type: none"> <li>Track changes made to website (usage reports)</li> <li>Career Pathways satisfaction survey</li> </ul>	<ul style="list-style-type: none"> <li>Enhanced Adult Career Pathway Website</li> </ul>	Interim: Strength Final: Strength ( <a href="#">See page 49</a> )
<b>Activity 2.2.10</b>	Implement system of continuous improvement to review and modify pathways if necessary	<ul style="list-style-type: none"> <li>QRP results</li> </ul>		Interim: Strength Final: Strength ( <a href="#">See page 51</a> )
<b>Priority 3: Demonstrate Improved Employment Outcomes (Core Element 5)</b>				
<b>Strategy 3.1: Statewide Dissemination of Program Graduate Employment Data</b>				
Activities		Methodology	Deliverables	Evaluation Findings
<b>Activity 3.1</b>	Develop a sustainable system for tracking and reporting graduate outcomes for a Wisconsin Employment Scorecard	<ul style="list-style-type: none"> <li>Participant observation of meetings</li> <li>Stakeholder satisfaction survey</li> <li>Track fidelity to timeline</li> </ul>	<ul style="list-style-type: none"> <li>Wisconsin Employment Results Scorecard</li> </ul>	Interim: Super Strength Final: Super Strength ( <a href="#">See page 52</a> )

### Appendix A: List of Interviewees

Name	College	Role	Summer 2014	Spring 2015	Spring 2016
Michael Gagner	BTC	Evaluation Liaison	X		
Kristin Hesselbacher	BTC	INTERFACE Project Manager	X	X	X
Patricia Kempinski	BTC	Associate Dean	X	X	
Andy McGrath	BTC	Manager, Grant Administration and Budget Development	X	X	X
Lynn Neitzel	BTC	Curriculum Specialist		X	X
Ed Scoville	BTC	IT Instructor		X	X
Carissa Johnson	BTC	IT Outreach Specialist		X	X
Helen Proeber	BTC	Associate Dean			X
Claire Roder	CVTC	Institutional Research Data Analyst	X		
Margaret Dickens	CVTC	Director of Planning, Grants, and College Effectiveness	X	X	X
Julie McFadden	CVTC	INTERFACE CVTC Project Manager	X	X	X
Melissa Wilson	CVTC	Marketing Manager		X	
Jenna Kulasiewicz	CVTC	Credit for Prior Learning Coordinator		X	
Shawn Creviston	CVTC	Instructor & Information Technology Program Chair		X	
Cherrie Bergandi	CVTC	Dean of General Education & Business		X	
Kelly Thompson	CVTC	Student Success Specialist		X	
Lexis Michels	CVTC	Institutional Research & Evaluation Specialist		X	X
Jay Stulo	FVTC	Project Contact & Evaluation Liaison, Director of Learning Innovations	X	X	X
Joe Wetzel	FVTC	IT Instructor	X	X	X
Anne Haberkorn	FVTC	Dean of IT & Distance Learning	X	X	
Laura Waurio	FVTC	Evaluation Liaison, Research Data Analyst		X	X
Dianna Mann	FVTC	Grant Contact, Grants Coordinator		X	X
Margaret Rubin	FVTC	Director of College and Career Pathways		X	
Doug Waterman	FVTC	Dean of IT & Distance Learning			X
Ray Koukari	GTC	Project Contact	X		
Erika Bernhardt	GTC	Divisional Dean Associate	X		
Angela Carey	GTC	Research Specialist	X		
Cheryl Ucakar	GTC	Project Contact	X	X	X
Amy Anderson	GTC	Grant Contact	X	X	X

Name	College	Role	Summer 2014	Spring 2015	Spring 2016
Jaime Spaciel	GTC	Program Effectiveness Specialist	X	X	X
Jeanne Suda	GTC	IT SharePoint Outreach Coordinator	X	X	X
Ty Kinis	GTC	IT Faculty Member		X	X
David Schubot	GTC	Research Specialist			X
Nicki Kiss	LTC	Evaluation Liaison, Director of Institutional Effectiveness	X		
Karla Zahn	LTC	Grant Contact, Advancement Director	X		
Ed Janairo	LTC	Project Contact, Dean of Business & Technology	X		
Jim Lemerond	LTC	Project Contact, Dean of Health & Human Services	X	X	X
Jalen Karenke	LTC	Life Coach	X	X	X
Erin Gaedke	LTC	Health Information Programs Instructional Assistant	X	X	X
Nancy Carmen	LTC	Medical Assistant Instructor	X	X	X
Christina Skasa	LTC	Project Contact, Grants Specialist		X	X
Sami Kasten	LTC	Evaluation Liaison, Institutional Researcher		X	X
Ken McCullough	Madison	Project Contact, IT Program Director	X	X	X
Schauna Rassmussen	Madison	Interim Associate Dean – Business and Applied Arts	X	X	X
Lana McCarthy	Madison	Instructional Lab Planner	X	X	X
Kathy Sorenson	Madison	Dean of Applied Arts		X	X
Nina Milbauer	Madison	IT Instructor		X	X
Denise McKay	Madison	Grants Officer		X	X
Jennifer Ball Sharpe	Madison	IT Senior Advisor		X	X
Sean Stilson	MSTC	Associate Dean, Business Division	X		
Gary Kilgas	MSTC	Associate Dean, Technical & Industrial Division	X	X	X
Marie Schmieder	MSTC	Manager, Grants Development	X	X	
Jackie Shea	MSTC	Grant & Project Coordinator	X	X	
Stephanie Knuth	MSTC	Instructional Technology Coordinator	X	X	
Leslie Kozicki	MSTC	Evaluation Liaison		X	X
Jessica Planer	MSTC	Grants/Project Manager			X
Simone Fevola	MSCT	Grant Management Specialist			X
Mark Wachowiak	MSTC	Distributed Control Systems Course Instructor		X	
Brenda Schmitt	MATC	Finance Contact	X		X

Name	College	Role	Summer 2014	Spring 2015	Spring 2016
Cheralyn Randall	MATC	Grant Contact	X		
Terri Mutsch	MATC	Evaluation Liaison	X		
Mercedes Fisher	MATC	Project Contact	X	X	X
Carriel Danz	MATC	Project Coordinator	X	X	X
Pam Holt	MATC	Curriculum and Instructional Support Director		X	X
Kami Hall	MATC	Research, Planning, and Development Specialist		X	X
Heather Nilson	MATC	Milwaukee Area Workforce Investment Board Liaison		X	X
Starlette Patterson	MATC	Student Support Specialist		X	
Liz Falkowski	MATC	Help In Re-Employment (HIRE) Center Liaison		X	X
Stefanie Patti	MATC	Student Services Specialist			X
Fred Rice	MPTC	Project Contact, Dean of Applied Technology and Trades	X	X	X
Ben Konruff	MPTC	Evaluation Liaison, Research Analyst	X	X	
Anne Lemke	MPTC	Project Contact, Grant Manager	X	X	X
Lisa Pollard	MPTC	Associate Dean of Business and IT	X	X	X
Dominic Garofalo	MPTC	IT Instructor	X	X	X
Jeff Stueber	MPTC	IT Instructor/Life Coach	X	X	X
Bojan Ljubenko	MPTC	Evaluation Liaison			X
Scott Messner	NATC	SharePoint and Reporting Developer	X		
Chuck Komp	NATC	Dean of Business and Instructional Effectiveness	X	X	X
Tony Bellman	NATC	IT Sector Liaison	X	X	
Aaron Panke	NATC	Instructional Technologist/Designer	X	X	X
Kelly Haverkamp	NATC	Planning, Development, and Evaluation Manager	X	X	X
John Van De Loo	NATC	Director of Accounting and Business Services	X	X	X
Heidi Woods	NATC	Grant Reporting Coordinator		X	X
Scott Biscobing	NATC	IT Instructor		X	X
Emily Stuckenbruck	NATC	Dean of Liberal Arts and Business			X
Ian Anderson	NATC	Academic Coach			X
John Van De Loo	NATC	Director of Accounting and Business Services			X
Dominic Gruetzmacher	NTC	IT Instructional Faculty	X		
Chris Severson	NTC	Dean-Business, Community Services & Global Education	X	X	X

Name	College	Role	Summer 2014	Spring 2015	Spring 2016
Vicki Jeppesen	NTC	Director of Resource Development & Institutional Advancement	X	X	X
Angie Servi	NTC	Institutional Researcher	X	X	X
Chrystal Heinrich	NTC	INTERFACE Career Advising Specialist	X	X	X
Rose Heier	NTC	Data and Report Specialist		X	X
Tricia Miller	NTC	Academic Advisor for IT, Medical, and Early Childhood		X	X
Jamie Chavez	NTC	IT Faculty		X	X
Bonnie Osness	NTC	Director of Career Pathways		X	X
Chris Gabrysczek	NWTC	Technical Person	X		
Vickie Lock	NWTC	Student Success	X		
Julie Ebben-Matzke	NWTC	Project Contact, Associate Dean of Business & Information Technology	X	X	X
Elizabeth Schaff	NWTC	Grant Contact, Grants Manager	X	X	X
Jeff Grebinoski	NWTC	Evaluation Liaison, Institutional Researcher	X	X	X
Randy Smith	NWTC	Dean of Business & Information Technology	X	X	X
Randy Maurer	NWTC	Academic Coach		X	X
Simeon Xiong	NWTC	Academic & Career Advisor		X	X
Sandy Folsom	NWTC	INTERFACE Coordinator/Strategic Partnership		X	X
Tammie Engelke	SWTC	Project, Contract and Outreach Services Accountant	X		
Duane Ford	SWTC	President	X		
Phil Thomas	SWTC	Vice President of Student and Academic Affairs	X	X	X
Richard Ammon	SWTC	Dean of Business, Management and General Studies	X	X	X
Barb Tucker	SWTC	Director of Institutional Advancement	X	X	X
Tonya Archie	SWTC	Supply Chain Management Instructor	X	X	X
Nancy Flanagan	SWTC	Grants Support Specialist	X	X	X
Louise Bradley	SWTC	Grant Coordinator	X	X	X
Holly Crubel	SWTC	Grant Accountant		X	X
Kristal Davenport	SWTC	Instructional Technology Support Specialist		X	X
Amy Poteet	SWTC	Online Specialist		X	X
Linda Miller	WCTC	Director – Grants and Contracts	X		
Ben York	WCTC	Instructor and Coordinator for Service Learning Course	X		

Name	College	Role	Summer 2014	Spring 2015	Spring 2016
Danielle Hoffman	WCTC	IT Skills & Placement Coordinator	X	X	X
Kim Ehler	WCTC	Associate Dean – Business Information Technology	X	X	X
Victor Brenner	WCTC	Institutional Research Coordinator	X	X	X
Chris Hasler	WCTC	Business & IT Network Support Specialist	X	X	X
Jeanne Williams	WCTC	Curriculum Specialist		X	X
Todd Beidel	WCTC	IT Instructor		X	X
Erica Krzyszkowski	WCTC	IT Skills & Placement Coordinator			X
Josh Gamer	WTC	Associate Dean - Business Division	X		
Jackie Helgeson	WTC	Manager of Veteran Services	X		
Rebekah Philips	WTC	Prior Learning Advisor	X		
Tonya Wagner	WTC	INTERFACE Project Lead	X	X	X
Gary Brown	WTC	Dean Business Division	X	X	X
Scott Finn	WTC	Institutional Research	X	X	X
Ray Slattery	WTC	Lead Instructor	X	X	X
Rande Daykin	WTC	Director of Resource Development & Grant Administration		X	X
Ray Heidel	WTC	Outreach & Workforce Development		X	X
Janet Erickson	WTC	Grants Administration		X	X
Lori Turner	WTC	Accounting		X	X
Paula Speropoulos	WTC	Veterans Services		X	X
Shannon Corcoran	WTC	Business Management Faculty		X	X
Jennifer Kunselman	WITC	IR Representative (Research & Data Coordinator)	X		X
Nancy Cerritos	WITC	IT Academic Dean	X	X	X
Jeff Heathman	WITC	IT Faculty	X	X	
Mary Zinnecker	WITC	DWD Liaison	X	X	
Jennifer Schultz	WITC	Resource Development Technician	X	X	X
Mary Ann Pebler	WITC	Resource Development Director	X	X	X
Cindy King	WITC	Senior Director, Curriculum	X	X	
Paul Gordon	WITC	IT Faculty	X	X	
Emily Bailkey	WITC	Manager, Enrollment Services	X	X	X
Justin Johnson	WITC	Student Services Dean		X	

Name	College	Role	Summer 2014	Spring 2015	Spring 2016
Mike Miller	WITC	IT Instructor		X	
Greg Brodt	WITC	IT Instructor		X	
Eric Lockwood	WITC	Career Advisement Specialist		X	X
Kayti Stolp	WITC	Career Advisement Specialist			X
Laura Sullivan	WITC	Manager of Enrollment Services		X	

## Appendix B: INTERFACE Evaluation Research Questions, Outcomes, & Deliverables

### Implementation Evaluation Research Questions

#### Activity 1.1.1

- Was a framework established for aligning regional/state initiatives?
- To what extent did representatives feel that they were involved at an appropriate level for the framework planning?
- To what extent did participants perceive the planning process to be effective?

#### Activity 1.1.2

- Was there a statewide set of core competencies developed for the standardized computer literacy course?
- To what extent did the colleges deliver the course as they intended to? How did delivery differ across colleges?
- To what extent did each of the partners (employers, workforce system, other training providers and educators, philanthropic organizations, and others as applicable) contribute to the development of the core computer competencies?
- In what ways did the 16 WTCS colleges implement the basic computer literacy course differently?
- Was the implementation of the computer literacy course aligned with the evidence-based practice?
- To what extent did the Workforce Development Board feel that the basic computer literacy course helped students develop the skills needed for success in the workplace?
- To what extent did employers feel that the basic computer literacy course helped student develop the skills needed for success?

#### Activity 1.2.1 & 1.2.2

- How many professional development training sessions were offered by Wisconsin's Making the Future?
- How many representatives from the 16 WTCS colleges attended the training sessions?
- What PLA strategies did each of the 16 WTCS colleges commit to implementing?
- Was the implementation of the prior learning assessment aligned with the evidence-based practice?
- Were the professional development training session attendees satisfied with their experience?
- To what extent did students feel the PLA process was effective?

#### Activity 2.1.1

- What processes were used to develop the Mobile Apps?
- What Mobile Apps were implemented at each of the 16 WTCS colleges?
- To what extent did students feel they had appropriate training to effectively utilize the Mobile Apps to learn?
- To what extent did instructors feel they had appropriate training to effectively utilize the Mobile Apps in their course(s)?
- To what extent were students satisfied with the use of Mobile Apps?
- To what extent were instructors satisfied with the use of Mobile Apps?
- Did student performance increase after the use of the Mobile Apps?
- Was an online repository created for Mobile Apps?

#### Activities 2.2.1, 2.2.2, & 2.2.3

- How was the curriculum selected, used, and/or created?
- How were programs and program designs improved or expanded using grant funds?
- What delivery methods were offered?
- What was the program administrative structure?

- What contributions did each of the partners (employers, workforce system, other training providers and educators, philanthropic organizations, and others as applicable) make regarding: leveraging of resources; commitment to the sustainability of the INTERFACE Project; program design; curriculum development; placement of students; program management; training?
- To what extent do instructors feel the newly developed curriculum aligns with learning objectives?
- To what extent do employers feel the newly developed curriculum aligns with industry standards?
- Was the newly developed curriculum developed and offered in alignment with the timeline?
- Did the colleges strengthen their partnership with Job Centers/WDBs?

**Activities 2.2.4 & 2.2.5**

- What articulation agreements have been created?
- Were transfer opportunities increased for students?
- What impact did the Bellevue University on-site representatives have on WTCS campus, programs, students, etc.?

**Activity 2.2.6**

- Did retention increase for programs offered at the 16 WTCS colleges?
- How satisfied are students with the training they have received (classes, advising, internship/job search, resources (classroom equipment, digital tutors, learning tools, etc.))?
- What contributions did each of the partners (employers, workforce system, other training providers and educators, philanthropic organizations, and others as applicable) make regarding recruitment of participants?
- What support services and other services were offered?
- Was an in-depth assessment of participants' abilities, skills, and interests conducted to select participants into the grant program?
- What assessment tools and processes were used?
- Who conducted the assessment?
- How were the assessment results used?
- Were the assessment results useful in determining the appropriate program and course sequence for participants?
- Was career guidance provided, and if so, through what methods?

**Activities 2.2.7 & 2.2.8**

- How many Career Expos were offered at the 16 WTCS colleges?
- How many internships and work-based learning experiences did students attain across the 16 WTCS colleges?
- To what extent were students satisfied with the Career Expos?
- To what extent was the implementation of internships/work-based learning aligned with the evidence-based practice?
- To what extent do employers believe students are entering the workforce with the skills needed to succeed/help them?
- To what extent did students feel their internship/work-based learning experience prepared them for future professional work/career?

**Activity 2.2.9**

- In what ways was the Adult Career Pathway website updated?
- What do students think about the Adult Career Pathway website?
- To what extent did website traffic increase after improvements to the Adult Career Pathway website?
- To what extent are stakeholders of the website satisfied with the Adult Career Pathways website?

**Activity 2.2.10**

- Was a system of continuous improvement created to review and modify pathways if necessary?
- Was the formative feedback provided by the external evaluator used by WTCS stakeholders?
- To what extent do stakeholders feel the process of continuous improvement was valuable?

**Activity 3.1**

- Was a Wisconsin Employment Scorecard created to track and report graduate outcomes?
- To what extent did all 16 WTCS colleges implement the use of the scorecard?
- To what extent did each of the partners (employers, workforce system, other training providers and educators, philanthropic organizations, and others as applicable) contribute to the development of the Wisconsin Employment Scorecard?

**All/Most Activities** (questions are addressed under all appropriate activities)

- What factors contributed to partners' involvement or lack of involvement in the program?
- Which contributions from partners were most critical to the success of the grant program?
- Which contributions from partners had less of an impact?
- To what extent are consortium members (colleges) working together to share grant experiences (successes, failures, etc.)?
- To what extent do stakeholders feel collaboration has increased among the consortium?
- What areas of collaboration do the stakeholders think need improvement?
- What did stakeholders think the strengths of the overall planning process were?
- What did stakeholders think the weaknesses of the overall planning process were?
- What did stakeholders think the strengths of the implementation process were?
- What did stakeholders think the weaknesses of the implementation process were?
- To what extent do stakeholders feel they are making adequate progress on their work? If not, what are the barriers they are facing?
- Was the implementation of the career pathways aligned with the evidence-based practice?
- Was the implementation of the technology aligned with the evidence-based practice?

**USDOL Outcomes/Impact Analysis**

How many unique participants were served?

What is the total number of unique participants who have completed a grant-funded program of study?

What is the total number of incumbent workers who have completed a grant-funded program of study?

What is the total number of unique participants retained in their program of study or another grant-funded program(s)?

What is the total number of unique participants retained in another educational program(s)?

What is the total number of credit hours completed by participants in grant-funded certificate and degree programs?

What is the total number of students completing credit hours?

What is the total number of degrees or certificates earned by participants for grant-funded programs?

What is the total number of students who earned certificates designed to be completed in one year or less?

What is the total number of students who earned certificates designed to be completed in more than one year?

What is the total number of students who earned degrees?

What is the total number of participants who are pursuing further education after program of study completion?

What is the total number of participants who are employed after program of study completion?

What is the total number of participants retained in employment after program study completion?
What is the total number of incumbent workers who received an increase in wages at any time after becoming enrolled?
<b>INTERFACE Project Outcomes</b>
Did the INTERFACE Project interventions have a significantly positive effect on students who received the training program(s) as compared with students who did not?
Did students who participated in grant-funded courses persist and complete credential programs at higher rates than a comparison group of those that did not?
Did the students fare better in terms of finding and keeping jobs? And as compared to their previous employment attempts prior to the intervention?
Did the students achieve higher earnings once they found a job, as compared to their previous employment record?
To what degree were graduates of grant-funded programs viewed as more employable than students in a comparison group?
To what degree did workers gain a greater ability to earn a living wage than workers in a comparison group?
To what extent did Job Centers and Colleges align the classes they offer?
To what extent was there greater coordination among agencies providing services to TAA, Veterans, and adult learners?
Did students participating in grant-funded programs have an increased opportunity to earn industry-recognized credentials than students in a comparison group?
Did students participating in grant-funded programs have an increased opportunity to complete the program(s) in less time than students in a comparison group?
To what extent did each of the colleges increase IT credentials that have value in the local workforce?
Did students participating in a grant-funded program gain proficiency in valuable IT/computer skills as compared with students who did not?
Did enrollment in IT programs and certificates increase among WTCS colleges?
<b>INTERFACE Project Deliverables</b>
Were there Bi-Annual Statewide and Regional Collaborative Planning Meetings held?
Was an Annual Sector Strategy Workshop offered in Year 2 and 3?
Did each of the colleges offer a Standardized Basic Computer Literacy Course?
Did each consortium member implement 1-3 PLA strategies?
Were 375 Mobile Apps developed and/or customized?
Was an online repository of IT Mobile Apps created to allow for broad dissemination?
Were two new Associate Degrees developed?
Were up to nine new certificates developed?
Were up to three general education courses with IT specific content developed?
Were at least ten new courses developed?
Did all 16 colleges establish industry driven road maps/pathways to IT and related careers?
Did all 16 colleges create IT related articulation agreements with Bellevue University?
Did all 16 colleges offer IT Career Expos annually?
Was the Adult Career Pathway website enhanced to meet stakeholders' expectations?
Was a Wisconsin Employment Results Scorecard developed?

Inputs

Activities

Outputs

Outcomes

Societal

1. Case Managers
  - TAA
  - WIA
2. TAACCCT Mentors
  - Louisiana / Mississippi's "Retraining the Gulf Coast Workforce through IT"
  - Nebraska "IMPACT Project"
  - Wisconsin "Making the Future"
  - Fox Valley Technical College "Advanced Manufacturing PLUS"
3. Employer Partners
4. Public Workforce System Partners
  - Wisconsin Workforce Development Association
  - Wisconsin Department of Workforce Development
  - Job Service Centers
5. Applied Experience & Internships

1. Develop relationships & build connections between WTCS & employers / industry
2. All stakeholders collaboratively identify key training needs
3. Engage local employers to identify changing needs of industry & integrate needs into new programs

1. No. of meetings with external partners
2. No. of IT internships gained with local employers
3. No. of jobs gained with local employers
4. No. of employers attending career fair
5. No. of employers providing subject matter expertise

1. Wider array of career & career exploration options
2. Employment-ready graduates
3. Increased ability for IT workers to earn living wages
4. Increased responsiveness to local workforce needs as defined by employers
5. Alignment of classes offered at job centers & colleges
6. Increased alignment across the colleges & DWD system about what it means to have IT computer literacy & be college ready
7. Common message delivered by Job Centers & Colleges for TAA, Veteran, & Adult workers
8. Strengthened partnership with Job Centers/WDBs

System

1. INTERFACE Project Staff
2. WTCS Office Staff
  - WTCS IT Education Director, Business & Information Technology
  - Education Director, Career Transition/Workforce Development
  - Education Director, Performance Analysis/Continuous Improvement
  - Administrative Services Coordinator
  - Associate Vice President
  - Associate Vice President, Office of Technology & Data Governance
3. Training Professionals
4. Outreach Staff
5. Financial Resources (Grant award, travel funds, meeting supplies, faculty stipends)
6. Communication/Agreements

1. Develop collaborative relationship between Consortium members & other institutions
2. Develop new programs and certificates
3. Develop / modify selected curriculum aligned with industry needs
4. Build / standardize online learning tools
  - Adult Career Pathways website
  - Develop 375 mobile apps
5. Identify & implement evidenced-based instruction practices
6. Implement new Prior Learning Assessment strategies
7. Develop a standardized, competency based computer literacy course that meets minimum requirements for students to successfully navigate college
8. Share competencies & computer literacy course among consortia members through WIDS
9. Develop Wisconsin Employment Results Scorecard
10. Develop / modify instructional approach
11. Define new stacked or latticed credentials

1. No. of strategic planning meetings among consortium
2. No. of articulation agreements between WTCS and 4-year colleges, & Bellevue University
3. No. of transfer students from WTCS colleges to 4-year colleges upon completion
4. No. of credits that transfer from one college to another college
5. No. of curricula developed / modified that meet industry needs & are valued in the workplace
6. No. of new programs and certificates created
7. Increased use of Adult Career Pathways website
8. No. of mobile apps edited, created, & updated
9. No. of agreements with WIDS to facilitate curriculum work
10. Scorecard and guidelines for utilization of results
11. Standardized prior learning /technology literacy assessment tools
12. Comprehensive & systematic set of IT competencies across WTCS, new course implemented in every district
13. No. of curricula developed / modified that meet industry needs & are valued in the workplace
14. No. of new stacked and latticed credentials available to students

1. Training programs as described in Scope of Work are implemented
2. Enhanced & standardized set of core competencies that help students develop as a professional
3. Enriched computer literacy skills course that meet the minimum competencies identified
4. Strengthened learning assessment tools
5. Increased ability for 2-year & 4-year schools to collaborate & share evidenced-based practices in developing/utilizing online curriculum/tools
6. Curriculum developed, modified, shared publicly (online) & used by college faculty
7. Increased capacity to track long-term performance through employment results scorecard
8. Increased strategies used by colleges to grant credit for prior learning
9. Increase in the number of credentials earned

School

1. Consortium College Members (IT Deans, Project Managers, Grant Contacts, Finance Contacts, Evaluation Liaisons, Curriculum Staff, Student Services Staff, Lab Assistants, Program Tutors)
2. Computers/Technology Devices
3. Classroom/Office/Lab Space
4. Assessment/Career Advising Tools
5. Course Content/Curriculum
6. Industry Knowledge & Expertise
7. Training Sessions

1. Faculty & staff participate in regional, state-wide, & sector strategy meetings and professional development
2. Delivery of technical assistance and/or training to WTCS colleges to support the design & use of grant-funded mobile applications
3. Develop & implement plan to identify & recruit students
4. Recruit necessary staff & faculty
5. Host Career Expo/IT Summits

1. No. of training sessions / workshops offered to students, faculty, & staff
2. No of students enrolled in grant-funded programs
3. No. of new faculty & staff hired through grant activities
4. No. of Career Expos hosted annually

1. Increased professional development opportunities for faculty
2. Faculty increase their skill sets & utilize multi-format curriculum to more effectively guide students
3. Increased enrollment in IT programs in WTCS colleges
4. Increased capacity (faculty) to deliver courses
5. Increased student access to employers

Student

1. TAA-Eligible
2. Veterans
3. Adult Learners
4. Dislocated Workers /Adults

1. Applied work experiences / internships
2. Conduct mock interviews
3. Leverage TACT2 work on Adult Career Pathways

1. No. of students as measured by DOL-required outcomes
2. No. of online learning tools offered
3. No. of students utilizing online learning tools
4. No. of students utilizing online career advising tool
5. No. of graduates that obtained credentials created as a part of the TAACCCT
6. No. of students attending career fairs
7. No. of students obtaining internships/jobs by attending fairs
8. No. of prospective students for 4-year programs
9. No. of meetings with external partners
10. No. of IT internships gained with local employment
11. No. of students referred by Workforce Agencies

1. Students have increased opportunities to earn more industry-recognized credentials & complete programs in less time
2. Students have increased opportunities to meet employers & gain employment in IT field
3. Students gain proficiency in valuable technology/computer skills
4. Students are able to more effectively utilize career pathways to navigate programs to employment or transfer to 4-year programs
5. Increased student engagement & commitment in learning/retention of core IT knowledge

## **Appendix D: Careful Selection of Covariates in the Presence of Model Uncertainty for Evaluators Interested in Unbiased Estimation of Causal Effects**

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### **Abstract**

The ongoing INTERFACE Project uses funds from the third round of the Trade Adjustment Assistance Community College and Career Training (TAACCCT) grant program to develop, improve, and expand educational training within the Wisconsin Technical College System (WTCS). An evaluation team from the Applied Research Center (ARC) at the University of Wisconsin-Stout was tasked with collecting and analyzing data to evaluate the effectiveness of the INTERFACE Project, regarding student outcomes relating to graduation and employment. This paper describes the statistical model that will be used during this evaluation, with an emphasis on theoretical details of general interest to evaluators.

*Keywords:* propensity score, potential outcomes, ignorable treatment assignment

## Careful Selection of Covariates in the Presence of Model Uncertainty for Evaluators Interested in Unbiased Estimation of Causal Effects

Statisticians make assumptions, such as the assumption that a study sample was randomly selected (Berk & Freedman, 2001). If a sample is not random, then assumptions of normality may not be justified (Friedman, 1937) and mistaken assumptions of independence can be problematic (Kruskal, 1988; Kelley, 1999). Also, statistical inference can be compromised when these assumptions are not met (Chatfield, 1995). Diagnostics, or validation techniques (NIST, 2016), can be useful when checking assumptions. Statistical simulation can be used to assess the sensitivity of outcomes or conclusions to departures from assumptions (Burton, Altman, Royston, & Holder, 2006). For more reading on sensitivity analysis see Rosenbaum (2005).

According to Guo & Fraser (2015), strongly ignorable treatment assignment (SITA) is an important assumption of propensity score analysis. This means that conditional on a set of covariates the potential outcomes are independent of treatment assignment (Rosenbaum & Rubin, 1983). This assumption is sometimes referred to as non-confounding (Austin, 2011). It is often difficult to verify SITA (Steiner, Cook, Shadish, & Clark, 2010), and sometimes validation of SITA is neglected altogether (Richars, Smith, Jennings, Bjerregaard, & Fogel, 2014; Choi, Burgard, Elo, & Heisler, 2015). When SITA fails, matching on observed covariates may balance observed covariates, but estimates for causal effects can still be biased due to the presence of unmeasured covariates (Harder, Stuart, & Anthony, 2010; Kretchmann, Vock, & Lütke, 2014; Rosenbaum, 2010). Lane, To, Shelley, and Henson (2012) provide an example where propensity scores were used in educational research, and they discussed SITA and sensitivity analysis. Evaluators can find similar discussions of interest in Tipton (2013), McIntire, Nelson, Macy, Seo, & Kolbe (2015), and Guo and Fraser (2015).

The United States Department of Labor (USDOL) has encouraged evaluators to utilize the methodology of propensity score matching (PSM) (Urban Institute, 2013). Rosenbaum and Rubin's (1983) research on the central role of the propensity score for causal effects has been cited over 15,000 times. Yet, Pearl refers to the opacity of SITA as an Achilles' heel, stating "No mortal can apply this condition to judge whether it holds even in simple problems" (Pearl, 2009a, p. 350). Pearl has shown how directed acyclic graphs (DAGs) can be used to select a set of covariates for adjustment (Pearl, 2009b, Section 3), but Rubin (2009) has called such an approach non-scientific. Wasserman (2010) covers both approaches to causal analysis in his book. Herein, the advice from both Pearl and Rubin have been incorporated into a single model. This approach is described within this article using an ongoing evaluation.

### Context

In 2009, the American Recovery and Reinvestment Act amended the Trade Act of 1974 to authorize the Trade Adjustment Community College and Career Training (TAACCCT) Grant Program. The TAACCCT grant provided community colleges and other eligible institutions of higher education with funds to expand and improve their ability to deliver education and career training programs (TAACCCT, 2011). In 2013, during the third round of TAACCCT, the Wisconsin Technical College System (WTCS) received \$23.1 million in funds meant to support the

development and improvement of its Intentional Networks Transforming Effective and Rigorous Facilitation of Assessment, Collaboration, and Education (INTERFACE) Project. Within WTCS, 16 colleges (see Figure 1) participated in the INTERFACE Project, which seeks to develop, improve, and expand adult educational training pathways to information technology-related careers in business, information technology, healthcare, logistics, automation, and manufacturing (INTERFACE Project, 2015).

Figure 1. Map of Wisconsin Technical College System.



Both the consortium of WTCS colleges and the USDOL are interested in the impacts and outcomes of the INTERFACE Project (Advance Wisconsin, 2015). A third-party evaluation team from the Applied Research Center (ARC) at the University of Wisconsin-Stout (UW-Stout) was brought on to assess the project. Over the four-year grant period, this evaluation team collected qualitative data through interviews with project stakeholders and students, collected and analyzed quantitative data being tracked by the colleges, and developed reports to provide formative feedback to project stakeholders. This feedback recommended needed improvements during the implementation phase and allowed the consortium of WTCS colleges and the USDOL to understand the impacts and outcomes of the INTERFACE Project (UW-Stout Evaluation Team, 2015). Student outcomes of interest for the project relate to graduation and employment. These outcome variables relate to program completion, retention, credits earned, further education, employment, employment retention, and wage.

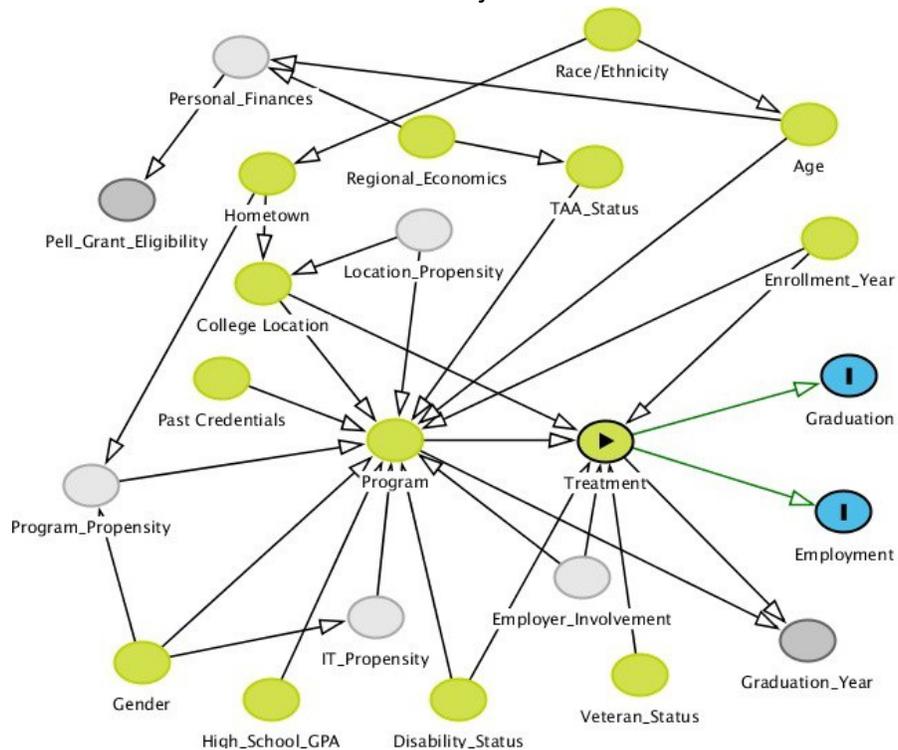
The INTERFACE Project is considered an intervention (a set of treatments) on the population of all students enrolled within WTCS between January 2014 and March 2017. The population is expected to be about 350,000 students. About 4,000 of these students will belong to the treatment group, meaning that they have been impacted by the INTERFACE Project. The causal effect of treatment was defined as the difference between that student's eventual outcome (data that will be obtained) and the outcome that student would have obtained had the intervention not occurred. Since the hypothetical outcome is counterfactual (Wasserman, 2010, Chapter 16), students will be matched based on covariate data where similar untreated students and outcomes will be compared. This difference in outcomes will be averaged over the population of all treated students and the result described as the treatment effect on the treated (Morgan & Winship, 2007). This analysis will be done separately for each outcome (Johnson & Wichern, 2007).

Covariates that the students will be matched on include ethnicity, gender, disability status, veteran status, hometown location, hometown regional economics, college for study, age, program of study, high school grade point average, past credentials, employer involvement in study, TAA status, veteran status, disability status, enrollment year, location propensity, program propensity, IT propensity, Pell Grant eligibility, and graduation year. Note that location propensity, program propensity, and IT propensity will be used within the model of treatment propensity. For example, an individual's treatment propensity is conditional based on their IT propensity. More specifically, it is anticipated that treated students will have a higher IT propensity than non-treated students. Binary educational outcomes include program completion, program retention (based on credits attempted), and further education. Pass rate is an educational outcome defined as the number of credits earned divided by the number of credits attempted. Binary employment variables include employment upon graduation (yes or no) and employment retention for six months. Wage is an employment variable defined as post-graduation wage minus pre-enrollment wage. See Appendix A for additional details regarding these variables.

### **Modeling**

The variables of interest are shown in Figure 2 as nodes of a DAG, which is also known as a Bayesian Network (Pearl, 2009a). The structure of this graph was based on information obtained from qualitative data collected during site visits, careful reading of the USDOL's Solicitation for Grants Application (United States Department of Labor, 2013), and mathematical simulations (see Appendix B). Within the graph, the indicator variable for treatment is represented with a triangular node. For simplicity, outcome variables are classified into two nodes, one for graduation and one for employment. The remaining nodes represent covariates. Classified as ancestors, the yellow nodes represent variables affecting treatment. Latent variables are represented by light gray nodes; these are unobserved. Variables that are observable, but do not affect treatment, are represented by dark gray nodes. All covariates are thought to affect all outcomes, except for ethnicity, gender, disability status, and veteran status, which are assumed to affect employment variables but not graduation variables. For graduation outcomes, these four covariates are thus considered instrumental variables, because they affect treatment but not outcome (Pearl, 2009b). Arrows are not drawn from covariates to outcomes for simplicity.

Figure 2. Bayesian network for the INTERFACE Project.



Comparisons between the average outcomes for the treated to the associated average outcomes for the untreated is not a sound method (Wasserman, 2010, Theorem 16.1). Such an approach is sometimes described as naive because it fails to control for covariates (Morgan & Winship, 2007). Failure to control for a covariate that affects both treatment and outcome can lead to considerable bias, but inappropriate control for covariates that are affected by treatment can also lead to considerable bias (Pearl, 2014). It is possible to utilize data associated with post-treatment variables as part of a multi-step procedure to estimate a causal effect (Pearl, 2009b), yet it has long been recognized that statisticians should not condition on post-treatment variables (Cox, 1958). Gelman (Gelman et al., 2004) and Rubin and Rosenbaum (as cited by Gelman, 2009) recommend adjusting for as many pre-treatment covariates as possible, but Pearl (2011), Woolridge (2009), and Myers et al. (2011) have pointed out that bias amplification is possible when instrumental variables are used within a propensity score analysis. An admissible set (Pearl, 2009b, p. 113) of covariates can be selected from our Bayesian network using the back-door criterion (Pearl, 2009b). However, there could be hidden relationships with additional covariates not present in the network (Armistead, 2014; Rosenbaum, 2010). Nevertheless, the network will be used to guide a conservative approach based on all the preceding considerations. The evaluation team will ignore instrumental and post-treatment variables and utilize as many of the remaining covariates as possible within a propensity score matching procedure. The covariate in Figure 3 is an instrumental variable. The covariate in Figure 4 is a post-treatment variable.

Figure 3. An instrumental covariate affecting treatment but not outcomes.

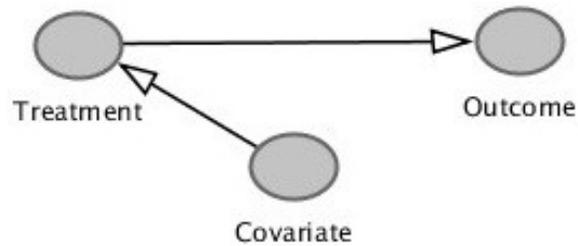
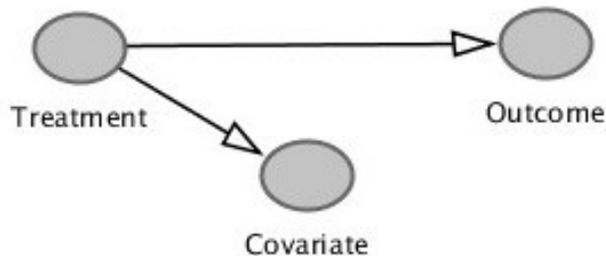


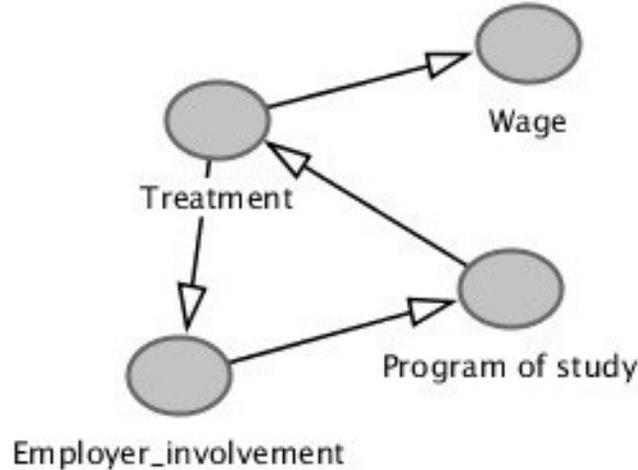
Figure 4. A post-treatment covariate affected by treatment.



After excluding instrumental and post-treatment variables we argue that with more covariates the assumption of SITA is more likely to be satisfied. SITA states that the potential outcomes are independent of treatment assignment conditional on the set of covariates (Wasserman, 2010), leading to the theoretical conclusion that matching produces unbiased estimates for causal effects (Rosenbaum & Rubin, 1983). This also operates under the stable unit treatment value assumption (SUTVA). SUTVA states that the outcome for any given individual is independent of the treatment status of other individuals. SUTVA is not perfectly satisfied in our situation because treatment may improve the chances of employment and graduates may be competing for a finite set of jobs. Mathematical simulations of this approach (see Appendix B) have convinced us to go ahead with our analysis as planned, assuming SITA and SUTVA, but for retrospective sensitivity analysis and reliability analysis we plan to fit related models on subpopulations identified from responses to surveys. When asked about their treatment assignment some respondents may specify that their enrollment was essentially random, and on this subpopulation a less in-depth analysis will be conducted and compared with the overall propensity score analysis.

Our Bayesian network may not perfectly reflect reality for all students. For example, the network may indicate that employer involvement affects treatment. However, for some students, especially those who anticipated benefits from treatment and made proactive career decisions, it may be the case that treatment affects employer involvement, resulting in the model shown in Figure 5, where the graph is no longer acyclic.

Figure 5. For some students, treatment may affect employer involvement.



The evaluation team estimates that 83% of treated students were “blind” to treatment, meaning that these students were unaware that their program was impacted by grant funds. The remaining 17% of students were aware of the grant’s influence on their program of study; therefore, these students will be referred to as un-blind. Separate analyses may be done for blinded and un-blinded populations of students. When asked about their competition for jobs, some respondents may indicate that there was little to no competition. If so, propensity score estimates will be produced on this subpopulation for comparison with the overall estimates. Also, a dose can be assigned to each treatment, and the dose-outcome relationships will be compared with overall estimates for treatment effects.

### Discussion

Prospective mathematical simulations helped guide our model construction process. See Appendix B for a sample of the R code that was used along with a sample graph showing agreement between simulation and theory. As an additional precaution, we may test the reliability of our conclusions by comparing the overall results to results obtained on subpopulations of interest. To assess the sensitivity of the conclusions to the particular modeling procedure that avoids conditioning on instrumental variables, avoids conditioning on post-treatment variables, actively conditions on as many pre-treatment variables as possible, and matches on propensity, the procedure may also be modified to see how conclusions are affected. Some modification of the entire analytic framework may be necessary.

There has been some criticism of propensity score methods. Under SITA propensity score matching may produce an unbiased estimate, but unbiasedness is not the only desirable quality of an estimator. To appreciate the historical context of this claim, see Salzburg (2001). In addition to unbiasedness, it is desirable for estimators to be consistent (Wasserman, 2010), efficient (Everitt, 2002, p. 128), and robust (Stigler, 2010). There are additional qualities as well (Salzburg, 2001, p. 66). Imai, King, and Nall (2009) provide some reasons for preferring fully blocked experiments over completely randomized experiments. King and Nielson (2016) explain

how general matching approximates a fully blocked experimental design while PSM approximates a fully randomized experimental design, arguing that this is a weakness of PSM. These researchers argue that PSM can lead to worse imbalance (King and Nielson, 2016, Sections 4 and 5).

The Counterfactual Model (Wasserman, 2004) typically considers two potential outcomes, one for treatment and one for control, with one realized and the other hypothetical for any given individual. The average causal effect can be defined as the average over some population of the difference between the two potential outcomes. For example, for headache relief, an acetaminophen (pain reliever) may be taken (treatment) or not (control), and the average difference in outcome over a whole population represents the causal effect of acetaminophen on headaches, assuming individuals within that population behave identically (excepting acetaminophen usage) under treatment and control. With acetaminophen, this is plausible, but with INTERFACE it may not be. An individual, who was treated with acetaminophen can hypothetically imagine doing everything the same but only without acetaminophen or perhaps with a placebo. An individual who was treated with INTERFACE funds does not have a counterfactual control scenario. For some programs of study, it is impossible to separate treatment from the program itself (i.e. it is impossible to go through the program without being treated, because the programs existence is tied up with the INTERFACE Project). In such cases, it is not clear what counterfactual behavior would occur had INTERFACE not intervened on WTCS. At a minimum, these concerns should be addressed through focus on subpopulations where counterfactual behavior is better defined. A more general framework could be used.

The use of subpopulations to check for sensitivity of results and conclusions to departures from model assumptions has been discussed. The data may also be analyzed to identify subpopulations where treatment affect is higher than average. For example, it may be that treatment is especially effective at preparing female veterans for employment, but less effective at increasing the wage of male incumbent workers generally. Because the overall estimates are for the treatment effect on the treated, these estimates potentially describe the benefits gained due to INTERFACE. There is not a plan to estimate treatment effects on the untreated (i.e. to predict what would happen if INTERFACE were expanded). This is largely because there are approximately 100 untreated students for every treated student. Thus, finding a match for each treated student is easier than the other way around. Likewise, a plan does not exist to estimate the causal treatment effects on the whole population. The focus has exclusively been on describing the benefits accrued to students due to the INTERFACE Project as actually implemented. The quantitative methodology described here is complementary to qualitative assessment and evaluation of the INTERFACE Project.

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## Appendix A

### Detailed Description of Variables and Techniques

Treatment is a dichotomous variable except during specific subpopulation analysis when treatment dose will be considered as an ordered polytomous variable or a continuous variable. Gender was treated as a dichotomous variable due to the data available from WTCS. For each region, the variable Regional Economic Strength is a weighted average of county-level median income over all counties within that region, with each county's weight equal to the proportion of the regional population living in that county. Each covariate is listed in the table below.

Table A1. List of Covariates

<b>Continuous Variables</b>	<b>Polytomous Variables</b>	<b>Dichotomous Variables</b>
<b>Regional Economic Strength</b>	Ethnicity (polytomous categorical)	TAA (Trade Adjustment Assistance) Status
<b>Age (in years)</b>	Credentials (ordered polytomous)	Gender
<b>Enrollment Year</b>	Program of Study	Veteran Status
<b>Enrollment Time</b>	Hometown (16 regions shown in Figure 1)	Disability Status
<b>High School GPA</b>	College (16 regions shown in Figure 1)	

The participants will be matched on propensity scores, with the propensity scores estimated from a model of treatment assignment in terms of the covariates just described (excepting ethnicity, gender, veteran status, and disability status for graduation related outcomes). If necessary, these or other variables may be utilized in several ways. For example, a hidden variable may be used to adjust wage data before propensity score analysis if the variable is responsible for large wage value discrepancies. Logistic functions may be utilized for continuous variables, perhaps with interaction, as part of the model of propensity. To ensure sufficient counts within categories for the purposes of modeling propensity, categories may be combined or variables eliminated. This will be done in an objective manner. A separate model of propensity will be fit for each of the seven different outcomes under study. Stratification or multiple regression may be utilized in place of matching when appropriate, especially in situations where simulations indicate the bias can be reduced (see Appendix C). General matching may be used in place of PSM (see Section 5.2). A sensitivity analysis will be conducted as described in Rosenbaum (2010, Section 3.4).

Program completion is a dichotomous outcome variable recording whether the student completed their program or not (their first program of study). Completion may mean being

awarded a certification, diploma, or associate degree, depending on the program. Program retention is a dichotomous outcome variable measuring whether a student remained a full-time student throughout their first program of study (allowing for not more than a one semester break). Retention considers only credits attempted. Pass rate is a continuous educational outcome variable measuring the proportion of credits earned divided by credits attempted. Further education is a dichotomous outcome variable indicating whether a student went on to further study after their first program of study (affirmative only if further education begins within one semester of graduation). Employment is a dichotomous outcome variable recording whether recent graduates obtained full-time employment (within 6 months of graduation). Subpopulation analysis excluding employment in fields unrelated to study may be performed. Employment retention is a dichotomous outcome variable recording whether an employed individual (employed in the sense of the previous employment outcome) retains full-time employment for at least six months. Wage is the final outcome variable defined as the difference between post-graduation income for one business quarter and pre-enrollment income for one business quarter. Only individuals with full-time employment (before and after) are eligible for wage analysis. It is acceptable for the career or employment specialty prior to treatment to differ from the career or employment specialty post treatment.

## Appendix B

### R Programs for Simulations

The following function plots density curves.

```
plot.multi.dens <- function(s) { junk.x = NULL
junk.y = NULL
for(i in 1:length(s)) {
junk.x = c(junk.x, density(s[[i]])$x)
junk.y = c(junk.y, density(s[[i]])$y) } xr <-
range(junk.x)
yr <- range(junk.y)
```

```
plot(density(s[[1]]), xlim = xr, ylim = yr, main =
"Collider",xlab="Bias")
for(i in 1:length(s)) {
```

```
  lines(density(s[[i]]), xlim = xr, ylim = yr, col = i) } }
```

The following program plots bias for matching, stratification, and regression.

```
library(nonrandom) k=100 ### must be even
vb=numeric(k)
vr=numeric(k)
vs=numeric(k)
vm=numeric(k)
for (i in 1:k)
{
###begin.collider
t=c(rep(1,k/2),rep(0,k/2)) y1=rnorm(k,1,.3)
y0=rnorm(k,0,.3) y=c(y1[1:(k/2)],y0[(k/2+1):k])
w=rnorm(k,t,.3)+(y+rnorm(k,0,.3))
###end.collider
vb[i]=summary(lm(y~t))$coefficients[2,1]-mean(y1-y0)
vr[i]=summary(lm(y~t+w))$coefficients[2,1]-mean(y1-y0) M=data.frame(w,t,y)
Ns=ps.makestrata(M,stratified.by="w",breaks=5,name.stratum.index="stratum")
Ps=ps.estimate(Ns$data,treat="t",resp="y",stratum.index="stratum")
vs[i]=as.numeric(Ps$ps.estimate$unadj[2])-mean(y1-y0)
Nm=ps.match(M,matched.by="w",treat="t",name.match.index="match")
Pm=ps.estimate(Nm$data,treat="t",resp="y",match.index="match")
vm[i]=as.numeric(Pm$ps.estimate$unadj[2])-mean(y1-y0)
}
plot.multi.dens(list(vb,vr,vs,vm)) library(Hmisc)
le <- largest.empty(vb,vr,.1,.1)
legend(le,legend=c("Unadjusted", "Regression", "Stratification", "Matching"), col=(1:4),
lwd=2, lty = 1)
```

Sample output from this program is shown below. The program shown above simulates a situation where a single covariate is affected by both treatment and outcome. Such a covariate is called a collider. Modifications to the program between `begin.collider` and `end.collider` produce a wide variety of simulations reflecting different data generating processes. The program can be modified to assess susceptibility to bias from:

- multiple covariates
- mistakenly assuming SITA
- mistakenly assuming SUTVA
- misspecification of the propensity function form
- ignoring economic cycles
- using propensity rather than all covariates
- misspecification of the causal graph

Figure 6. Bias resulting from inappropriate adjustment for a collider.

