

PluggedIn and WorkREADY! at Southwest Virginia Community College: 2018 Final Report

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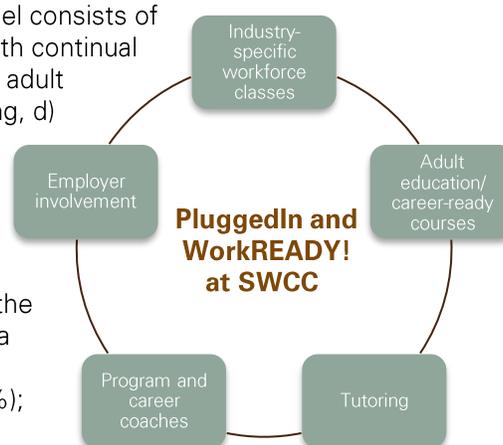
Executive Summary

To meet industry demands, Southwest Virginia Community College (SWCC) offered six months of intense training in advanced manufacturing through the PluggedIn and WorkREADY! program.

PluggedIn and WorkREADY! Description and Activities

The PluggedInVA model has a strong, evidence-based design, as illustrated by a recent study of a similar model implemented in Washington State (I-BEST, Van Noy & Wachen, 2011) and by a 2008 evaluation of the original PluggedInVA model at a pilot site. These studies and others (Capps, 2012; Simmons, 1995) suggest that adult students engaged in contextualized programs are more likely than their counterparts in more general programs to persist to graduation, earn college credits and career certificates, and improve on basic skills assessments.

SWCC's PluggedIn and WorkREADY! cohort model consists of five components designed to provide students with continual support: a) industry-specific workforce classes, b) adult education and career-readiness courses, c) tutoring, d) program and career coaching support, and e) employer support and involvement (Figure E1).



SWCC recruited TAA-eligible adults, veterans, unemployed or underemployed adults, and adults without a high school diploma for participation in the six-month PluggedIn and WorkREADY! program; a total of 246 students participated. Students were primarily male (87%) and classified as White (96%); most were on financial aid (74%), and participants averaged around 30 years of age.

Figure E1. PluggedIn and WorkREADY! cohort model

Evaluation Design Summary

To monitor and improve the PluggedIn and WorkREADY! program and to determine the program's effects on participants' academic performance, employment prospects, and skills acquisition, SWCC contracted with Magnolia Consulting, LLC, a small, woman-owned, independent research and evaluation company, to conduct an external implementation and impact evaluation.

Implementation Study Design

The implementation evaluation addressed seven key questions across two broad areas: 1) Implementation Process and Structure and 2) Implementation Fidelity (Figure E2).

Implementation Process and Structure

- (I1) How did program personnel create the PluggedIn and WorkREADY! curriculum? What was the program administrative structure? How did specific individuals (e.g., program director, coaches, staff members involved in project) contribute to the program design, development, and implementation (i.e., recruitment, training, placement, management, sustainability, efficient use of resources)? What factors

affected program personnel's involvement or lack thereof? Are employers involved in the planning of the PluggedIn and WorkREADY! program?

(12) Did SWCC conduct an in-depth assessment of participants' abilities, skills, and interests to select or enroll participants into the PluggedIn and WorkREADY! program? What assessment tools and processes did SWCC use? Who conducted the assessments? How were the assessment results used? Were the assessment results useful in determining the appropriate program and course sequence for participants?

(13) How did PluggedIn and WorkREADY! students find out about the program?

Implementation Fidelity

(14) How did program personnel use the curriculum? How was the quality of implementation? What did staff view as program strengths and potential areas of improvement?

(15) Are employers involved in implementation of the PluggedIn and WorkREADY! program? Which employer contributions were particularly successful or unsuccessful? What did employers view as program strengths and potential areas for improvement? Do employers believe SWCC courses are targeted to workforce needs?

(16) How did program personnel use funding to make improvements during implementation? How was the program delivered to students? What supports or other services were offered to students? Did students receive career guidance? If so, what were the delivery methods? Did students participate in career planning opportunities and other supports offered by the school? What were student career perceptions after the program?

(17) What resources did PluggedIn and WorkREADY! students receive from SWCC? How did students perceive the PluggedIn and WorkREADY! class structure? What did students view as program strengths and potential areas for improvement? How engaged were students in the program?

Figure E2. Formative evaluation questions

To document the conceptual framework for the program, evaluators developed a program logic model (Appendix A) in collaboration with SWCC stakeholders. This framework then informed the development of appropriate implementation measures and provided a means of documenting adherence to program activities identified in the program logic model.

To measure implementation, evaluators used mixed methods, including surveys and focus groups with students, staff, and employers; reviews of program artifacts; and documentation of program modifications and revisions through regular, informal conversations with the project director, program coaches, and program faculty. These measures and the implementation analysis supported an understanding of how Department of Labor Round 4 TAACCCT funding built the capacity of SWCC to provide short duration, workforce-needs-aligned advanced manufacturing programs using the PluggedIn and WorkREADY! cohort model.

Outcome and Impact Study Design

The quasi-experimental outcome and impact evaluation addressed three key questions (Figure E3). Evaluators also examined SWCC performance on the nine Solicitation for Grant Application (SGA) outcomes articulated in the original SWCC proposal to the Department of Labor (DOL).

Outcomes and Impacts

(O1) How does participation in the PluggedIn and WorkREADY! program relate to positive student outcomes, including workforce knowledge, career readiness, academic and career interests, academic achievement, and employment?

(O2) What are the impacts of participation in the PluggedIn and WorkREADY! program on student workforce knowledge and career readiness? What is the impact of participation in the PluggedIn and WorkREADY! program on the development of digital literacy, communication, and 21st century skills?

(O3) What are the impacts of participation in the PluggedIn and WorkREADY! program on long-term employment (e.g., employment and retention, wage increases) and academic outcomes (e.g., program completion, credential attainment)?

Figure E3. Summative evaluation questions

The final analysis sample included 246 treatment students and 145 comparison students. Comparison students consisted of students in relevant advanced manufacturing majors at SWCC (i.e., welding, carpentry, machining/CNC, mechatronics).

For evaluation questions O1 and O2, evaluators used mixed methods, including end-of-program and retrospective pre-post reflections surveys with students¹; focus groups with students, staff, and employers; and SWCC institutional data and statewide data on academic and employment outcomes. These data supported an understanding of program outcomes across five areas for PluggedIn and WorkREADY students and provided a basic understanding of program impacts in three areas (based on retrospective pre-post survey data from treatment students and comparison students in similar programs).

For evaluation question O3, evaluators conducted propensity score analyses, using the inverse probability of treatment weights (IPTW) to maximize the comparability of the treatment and comparison groups. IPTW uses propensity scores to create weights that balance two nonequivalent groups on observed baseline covariates (i.e., demographic characteristics, program area). This analysis, which used SWCC and statewide employment data for treatment and comparison students, helped to provide an understanding of program impacts across three areas (academic achievement, academic interest, and employment).

The findings from evaluation question O3 provide greater evidence of program impacts than the findings from evaluation questions O1 or O2. However, even though the analysis included propensity score analysis methods to maximize the comparability of student groups, causal inferences cannot be made because participants were not randomly assigned to either group. Evaluators had access to a limited number of baseline covariates to use in calculating propensity scores; it is possible that these scores did not account for all baseline variables associated with self-selection into the treatment or comparison group.

Implementation Findings

The implementation evaluation yielded a number of findings around process and structure and implementation fidelity.

Implementation: Process and Structure

- SWCC developed the PluggedIn and WorkREADY! program based on the original PluggedInVA model. SWCC staff and employers collaborated on the development of new courses in precision machining and mechatronics and on the redevelopment of courses in carpentry and welding. (O1)
- The program administrative structure consisted of a project director, a program coach, an adult career coach/employment specialist, an adult education lead, and program faculty and administrative staff. Each staff member had different levels of

¹ Due to a small number of comparison students completing the Student Retrospective survey, findings for question O2 should be considered with caution.

involvement in the grant, but all emphasized that they work together as a team, viewing the contributions of each individual as beneficial (see Table E1). (O1)

Table E1. Levels of program involvement for PluggedIn and WorkREADY! staff

Area	Project Director	Coaches/Adult Education Lead	Instructors	Admin
Achieving program sustainability	☑	☑	✓	✓
Leveraging of resources	☑	☑	✓	✓
Program management	☑	☑	✓	✓
Student training	✗	✓	☑	✗
Recruitment	☑	☑	✓	✓
Curriculum development	✓	✓	✓	✓
Program design	☑	✓	✓	✓

Key: ☑ Full/high involvement, ✓ Somewhat/limited involvement, ✗ Not involved.

- SWCC placed students into the PluggedIn or WorkREADY! program based on the students' previous educational experiences and scores on the Virginia Placement Test (VPT). Students who did not have a high school degree or equivalent or who did have deficiencies in math or English (based on VPT scores) were placed into the PluggedIn program. Students with a high school degree or equivalent who demonstrated proficiency in one or both VPT areas were placed into the WorkREADY! program. (O2)
- Students primarily heard about the program through friends, recruiting postcards, SWCC staff, flyers, or outside agencies. (O3)

Implementation Fidelity

- All students received instruction in careers, soft skills, and digital literacy, and students received support from coaches or tutors. Only students in PluggedIn cohorts received adult education instruction. Students in WorkREADY! received content in similar topic areas to students in the PluggedIn program (e.g., college survival skills, writing practice). Coaches supported students in resolving any issues that might have prevented their success, whether those issues were personal, academic, or financial. (O1, O6, O7)
- Staff, students, and employers had positive perceptions about program quality and believed the program was delivered effectively. Overall, students, staff, and employers commented on several implementation strengths, such as the use of varied recruitment methods, the use of a cohort model, the high level of employer involvement, the inclusion of embedded supports to address student needs, and highly collaborative staff. They also highlighted some challenges and areas that need improvement, such as difficulty in condensing programs to a six-month timeframe, issues with maintaining SWCC–employer communication as the grant progressed, and difficulties in increasing student attendance and retention. (O4, O5, O7)
- Twenty-five employers actively participated in program implementation. They inspected student work, assisted with mock interviews, hosted field trips and tours, interviewed and hired program graduates, attended Capstone presentations, and supported curriculum development. (O5)

- Staff made scheduling adjustments in response to student feedback. SWCC staff also purchased additional equipment and supplies using DOL TAACCCT grant funds. (O6)
- Students liked the cohort structure and full-time design of PluggedIn and WorkREADY! Students also reported high levels of engagement across all instructional and career-focused courses. Overall, students were most engaged in workforce courses and associated labs and reported high to very high motivation to pursue careers in advanced manufacturing after program completion. (O6, O7)

Participant Impacts and Outcomes

The study yielded several findings pertaining to the impact and outcome evaluation.

- PluggedIn and WorkREADY! students reported gains in knowledge (i.e., workforce knowledge, job application and interview skills, digital literacy) and increased confidence related to career readiness (i.e., job application and interview skills, 21st-century skills, professional and soft skills), and these gains were statistically significant. Additionally, 81% of enrolled students attained at least one third-party credential and 61% completed the program. Of program completers, 29% continued their education at SWCC after completing PluggedIn and WorkREADY! and at least 48% were employed within one month of program completion. (O1)
- PluggedIn and WorkREADY! and comparison students both reported knowledge gains and increases in career readiness–related confidence. However, readers should use caution in interpreting these findings due to small comparison and treatment sample sizes on the Student Retrospective survey. (O2)
- Three separate weighted binary logistic regressions, controlling for final GPA, showed that PluggedIn and WorkREADY! students’ odds of program completion were approximately 3.5 times that of comparison students; their odds of dropping out were 67% lower than traditional students; and their odds of attaining at least one third-party credential were 8 times that of traditional students. (O3)
- A weighted binary logistic regression, controlling for final GPA, showed that PluggedIn and WorkREADY! student completers odds of pursuing further education at the college were not statistically different from comparison student completers. (O3)
- A final weighted binary logistic regression showed that PluggedIn and WorkREADY! student completers’ odds of finding employment within one month of program completion were approximately 2.5 times that of comparison students who completed their programs. There were no statistically significant differences in employment retention rates or wage increases by condition. (O3)
- SWCC met 5 of the 9 benchmarks articulated in the original SWCC proposal to DOL and nearly met an additional two benchmarks, achieving 86% to 97% of target (see Table E2).

Table E2. Performance on outcomes articulated in the SWCC DOL proposal

	Outcome	Target (n)	Achieved (n)	Percent Achieved
1	Participants served by PluggedIn and WorkREADY! programs	224	251	112%

	Outcome	Target (n)	Achieved (n)	Percent Achieved
2	Participants completing PluggedIn and WorkREADY! programs	157	153	97%
3	Participants retained in PluggedIn and WorkREADY! programs	31	1	3%
4	PluggedIn and WorkREADY! participants completing credit hours	179	208	116%
5	PluggedIn and WorkREADY! participants earning credentials	157	203	129%
6	Participants enrolled in further education after completing PluggedIn and WorkREADY!	34	44	129%
7	Participants employed after completing PluggedIn and WorkREADY!*	85	73	86%
8	Participants retained in employment 3–9 months after completing PluggedIn and WorkREADY!*	63	67	106%
9	PluggedIn and WorkREADY! participants employed at enrollment who received a wage increase after enrollment*	36	21	58%

* SWCC did not have employment data for 65 program completers. As a result, employment and wage percentages should be considered as approximate and may underestimate actual employment numbers.

Conclusions

The PluggedIn and WorkREADY! program at SWCC was well designed and structured, with explicit procedures for recruitment and acceptance and a unique five-step cohort model. Across the grant period, SWCC staff implemented the program well, with fidelity to the original logic model. The program demonstrated encouraging outcomes and impacts across several areas.

The results directly support SWCC in improving programs for future students, offering a promising model for improving student academic, career, and skill-related outcomes. These findings also lend support to community colleges seeking ways to improve academic and employment outcomes. These results may be of particular interest to rural colleges that serve large numbers of dislocated workers. Based on these findings, we offer several recommendations for developing and implementing similar models at other community colleges:

- Plan for staff turnover at the beginning of the grant.
- Build a strong leadership and highly effective program management structure.
- Consider using a cohort model to promote feelings of community and connection.
- Offer integrated and contextualized developmental or remedial education, as needed.
- Offer shorter-duration programs (e.g., 6 months), as these may be particularly beneficial for dislocated workers.
- Nurture a small, community feeling in community college programs.
- Incorporate opportunities for students to visit local employers and job sites.
- Build long-lasting relationships with regional employers.
- Look for ways to fully cover program expenses for participating students.

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Table of Contents

Introduction.....	1
Overview of PluggedIn and WorkREADY!	2
Evaluation Design	3
Study Participants	5
Implementation: Process and Structure.....	7
Implementation Fidelity.....	7
Program Outcomes.....	10
Summary	20
References	24
Appendix A. PluggedIn and WorkREADY! Logic Model	28
Appendix B. Summative Evaluation Design and Questions.....	29
Appendix C. Data Strategies and Measures	30
Appendix D. Evaluation Time Frame	33
Appendix E. Analysis Procedures.....	37
Appendix G. Additional Information on Implementation: Process and Structure	39
Appendix H. Additional Information on Implementation Fidelity	47
Appendix I. Additional Information on Outcomes.....	50

Introduction

Researchers project that the manufacturing industry will create more than 3.4 million jobs nationwide over the next decade; two million of those jobs will go unfilled due to a shortage of qualified, highly skilled manufacturing workers (Giffi et al., 2015; McLeman, 2014; Norwin, 2013). In the southwest Virginia region, industry leaders have begun to capitalize on this manufacturing growth (Boston Consulting Group, 2013), building on research that suggests that “manufacturing industries offer the best hope for rebuilding the Southwest Virginia economic base” (King University, 2015, p. 3). However, the region has a shortage of qualified workers, particularly the medium-skilled workers needed for advanced manufacturing operations (e.g., machinists, welders, and industrial maintenance mechanics), as opposed to high-skilled (e.g., engineers) or low-skilled (e.g., assemblers) workers. Researchers believe community colleges can provide training to close this gap and increase the pool of highly qualified employees to support growth in advanced manufacturing in the region (Boston Consulting Group, 2013).

To meet this need for qualified workers, Southwest Virginia Community College (SWCC) created the PluggedIn and WorkREADY! program at the end of 2014. The program offered adults six months of intense training in targeted areas to build career skills. Participants who completed the program receive a career studies certificate (CSC), credits toward a GED (if they do not already have a high school diploma or equivalent), and college credit, as well as courses focused on skills needed in the workforce, such as welding, mechatronics, machining/CNC, and carpentry. The program was open to adults with a variety of skill levels and educational backgrounds.

In October 2014, SWCC received a four-year Round 4 grant from the Department of Labor’s Trade Adjustment Assistance Community College and Career Training (TAACCCT) program to monitor and improve PluggedIn and WorkREADY! implementation and to determine the program’s effects on participants’ academic performance, employment prospects, and skills acquisition. As part of the grant, SWCC contracted with Magnolia Consulting, LLC, a woman-owned small business specializing in independent research and evaluation, to provide an external evaluation of the program’s implementation and impacts; the results of the evaluation are intended to help SWCC make data-driven decisions about program improvements and to identify student impacts. This final report presents an overview of the PluggedIn and WorkREADY! program, a review of the evaluation design, a summary of demographic information on study participants, a brief discussion of implementation-related evaluation findings, a summary of program outcomes and impacts, and recommendations for developing and implementing a similar model at other community colleges.

Overview of PluggedIn and WorkREADY!

The PluggedIn and WorkREADY! model has a strong, evidence-based design, as illustrated by a recent study of I-BEST, a similar model implemented in Washington State (Van Noy & Wachen, 2011) and by a 2008 implementation evaluation of the original PluggedInVA model at a pilot site. These studies and others suggest that adult students engaged in contextualized developmental and remedial coursework are more likely than their counterparts in traditional developmental and remedial courses to persist to graduation, earn college credits and career certificates, and make gains on basic skills assessments within a community college setting (Capps, 2012; Simmons, 1995).

The PluggedIn and WorkREADY! program at SWCC incorporated several key elements:

- Training in industry-specific workforce skills, soft skills, 21st-century skills, digital literacy skills, and GED/basic skills;
- Resources to support students in planning Capstone projects, which present opportunities for students to showcase their knowledge in real-world, applied learning experiences;
- A career coach/employment specialist who supported students in preparing for the workforce by helping them develop career skills (e.g., résumé development, career planning) and network to find job opportunities;
- Program coaches who provided support to students in accessing needed resources (e.g., tutoring, financial services, personal advice, transportation assistance);
- A cohort model in which students learned and collaborated in a team environment; and
- Employer involvement in program planning (e.g., curriculum development) and implementation (via, for instance, field trips to workplaces, Q&A sessions for students, mock interview sessions).

Program staff recruited TAA-eligible adults,² veterans, unemployed or underemployed adults, and adults without a high school diploma for participation in the six-month program. Through the program, SWCC aimed to meet Virginia industry demands for a larger and more skilled workforce in carpentry, welding, machining/CNC, and mechatronics.

The PluggedIn and WorkREADY! program enabled the development of new courses in machining/CNC and mechatronics at SWCC, supported the redevelopment of courses in carpentry and welding, and offered new employment opportunities at the college. The DOL TAACCCT grant partially funded 11 positions: a career coach/employment specialist, a program coach, a project director, an administrative support specialist, a program administrative specialist, a data analyst, three adult basic education instructors, a CNC/machining technology and industrial safety instructor, and an associate welding instructor.

² TAA (Trade Adjustment Assistance)-eligible adults have lost their jobs to foreign trade; these individuals are eligible to receive reemployment services and assistance from the U.S. Department of Labor.

Evaluation Design

Evaluators used a quasi-experimental, mixed-method, formative and summative design, that incorporated propensity score analysis for the evaluation of the PluggedIn and WorkREADY! program. This final report highlights implementation findings and provides a detailed summary of program outcomes and impacts. A program logic model, developed in collaboration with program stakeholders, documents the conceptual framework of the program (see Appendix A, Figure A1). In the following sections, we describe the evaluation design, including formative and summative evaluation questions, data strategies (including measures and timelines), analysis procedures, and participant confidentiality procedures.

Formative Evaluation Questions

Over the course of three years, evaluators conducted a formative evaluation (i.e., implementation evaluation) to address evaluation questions in two key areas: (1) Implementation Process and Structure and (2) Implementation Fidelity (Figure 1).

Implementation Process and Structure

- (11) How did program personnel create the PluggedIn and WorkREADY! curriculum? What was the program administrative structure? How did specific individuals (e.g., program director, coaches, staff members involved in project) each contribute to the program design, development, and implementation (i.e., recruitment, training, placement, management, sustainability, efficient use of available resources)? What factors affected program personnel's involvement or lack thereof? Are employers involved in planning of the PluggedIn and WorkREADY! program?
- (12) Did SWCC conduct an in-depth assessment of participants' abilities, skills, and interests to select or enroll participants into the PluggedIn and WorkREADY! program? What assessment tools and processes did SWCC use? Who conducted the assessments? How were the assessment results used? Were the assessment results useful in determining the appropriate program and course sequence for participants?
- (13) How did PluggedIn and WorkREADY! students find out about the program?

Implementation Fidelity

- (14) How did program personnel use the curriculum? How was the quality of implementation? What did staff view as program strengths and potential areas of improvement?
- (15) Are employers involved in implementation of the PluggedIn and WorkREADY! program? Which employer contributions were particularly successful or unsuccessful? What did employers view as program strengths and potential areas for improvement? Do employers believe SWCC courses are targeted to workforce needs?
- (16) How did program personnel use funding to make improvements during implementation? How was the program delivered to students? What supports or other services were offered to students? Did students receive career guidance? If so, what were the delivery methods? Did students participate in career planning opportunities and other supports offered by the school? What were student career perceptions after the program?
- (17) What resources did PluggedIn and WorkREADY! students receive from SWCC? How did students perceive the PluggedIn and WorkREADY! class structure? What did students view as program strengths and potential areas for improvement? How engaged were students in the program?

Figure 1. Formative evaluation questions

Summative Evaluation Questions

For the summative evaluation, evaluators assessed the PluggedIn and WorkREADY! program's success in meeting its intended outcomes and examined program impacts on student employment and academic success (Figure 2).

Outcomes and Impacts

- (O1) How does participation in the PluggedIn and WorkREADY! program relate to positive student outcomes, including workforce knowledge, career readiness, academic and career interests, academic achievement, and employment?
- (O2) What are the impacts of participation in the PluggedIn and WorkREADY! program on students' workforce knowledge and career readiness? What is the impact of participation in the PluggedIn and WorkREADY! program on the development of digital literacy, communication, and 21st-century skills?
- (O3) What are the impacts of participation in the PluggedIn and WorkREADY! program on long-term employment (e.g., employment and retention, wage increases) and academic outcomes (e.g., program completion, credential attainment)?

Figure 2. Summative evaluation questions

Additional information about the summative evaluation design is provided in Appendix B.

Data Strategies

The formative evaluation examined the degree and extent of PluggedIn and WorkREADY! program development, implementation, and stakeholder engagement through surveys, semiannual meetings, program artifacts, and focus group sessions with SWCC staff members, participating employers, and PluggedIn and WorkREADY! students.

The summative evaluation analyzed institutional data for PluggedIn and WorkREADY! and comparison students; qualitative findings from staff, student, and employer focus groups; student perceptions of career readiness and program impacts captured through an Academic Experiences Survey and a Student Retrospective survey; and program impacts on academic and career outcomes measured through SWCC academic data and statewide employment data. Additional information on specific measures is available in Appendix C.

Evaluation Time Frame

The evaluation time frame corresponded to the program start and end dates for the PluggedIn and WorkREADY! cohorts. This final report includes formative and summative evaluation data for all sixteen cohorts. The first cohort began in January 2015 and the final cohorts ended in July 2017. For more information on cohort duration and evaluation dates, see Appendix D.

Analysis Procedures

Evaluators used Atlas.ti (qualitative data) and SPSS (quantitative data) to support data analyses. Qualitative data were analyzed using the techniques of analytic induction (Erickson, 1986). Evaluators analyzed quantitative data using descriptive statistics, t-tests, chi-square tests, and binary logistic regressions. Additional information on specific data analysis procedures is offered in Appendix E.

Participant Confidentiality

Evaluators believe strongly in the importance of human subjects protection, including maintaining participant confidentiality in data collection and reporting, and have participated in FERPA and NIH training on protecting human research participants. In compliance with FERPA regulations, evaluators used specific procedures to protect student and staff confidentiality in all data collection activities. SWCC provided student-level data to evaluators using anonymous ID numbers created by the college. Evaluators also avoided individual identifiers outside of roles (e.g., project director, instructor, coach, student) and aggregated data so that no individual is identifiable.

Study Participants

The final analysis sample included 246 treatment students and 145 comparison students. In this section, evaluators present student demographic information as well as results from the group equivalence analysis.

Demographics

The final study sample included 251 treatment students and 145 comparison students, for a total of 396 students. Across both conditions, the majority of students were male (91.41%). In regards to race and ethnicity, across both conditions, most students in the study were classified as White (97.22%), followed by African American (1.77%) and other (1.01%). The majority of students were not veterans (83.33%) and were receiving financial aid (74.94%).

Group Equivalence

Evaluators examined pretest equivalence between the treatment and comparison groups by conducting chi-square tests and an independent samples *t*-test on demographic characteristics (see Table 1). Findings from these analyses indicated a statistically significant difference between treatment and comparison students for three variables: gender, veteran status, and age at program enrollment. Treatment and comparison students were similar in regard to ethnicity and financial aid status. Because of the differences between treatment and comparison students in age, veteran status, and gender, evaluators used propensity scores and weighted quantitative analyses by the inverse probability of treatment weights (IPTW) to create balance between the treatment and comparison groups (Holmes & Olsen, 2010; Pirracchio, Resche-Rigon, & Chevret, 2012; Thoemmes & Ong, 2016). IPTWs removed imbalances for age ($p = .47$) and veteran status ($p = .07$), but not for gender ($p = .01$) (See Appendix E for additional information).

Table 1. Treatment and comparison student demographics and group equivalence tests

Characteristics	Comparison students (n = 145)		Treatment students (n = 251)		Total students (n = 396)		Test statistic	p-value
	Percent	n	Percent	n	Percent	n		
Gender ^a								
Male	98.62%	143	87.25%	219	91.41%	362	15.14	.00***
Female	1.38%	2	12.75%	32	8.59%	34		
Race ^a								
White	99.31%	144	96.02%	241	97.22%	385	3.92	.13
Black/African American	0.69%	1	2.39%	6	1.77%	7		
Asian	0.00%	0	0.00%	0	0.00%	0		
Two or more races/Other	0.00%	0	1.59%	4	1.01%	4		
Veteran ^a								
Yes	33.79%	49	6.77%	17	16.67%	66	48.31	.00***
No	66.21%	96	93.23%	234	83.33%	330		
Financial Aid ^a								
Yes	76.55%	111	73.71%	185	74.75%	296	0.40	.53
No	23.45%	34	26.29%	66	25.15%	100		
Characteristics	Comparison students (n = 145)		Treatment students (n = 251)		Total students (n = 396)		Test statistic	p-value
	Mean	SD	Mean	SD	Mean	SD		
Age ^b	24.8	8.00	30.4	11.16	28.4	10.46	-5.32	.00***

Significant at p = .05; *significant at p = .01

a. Analyses for gender, race, veteran status, and financial aid status were chi-square tests.

b. Analysis for age was an independent samples t-test.

Implementation: Process and Structure

This section provides an overview of SWCC's implementation of PluggedIn and WorkREADY!, including the recruitment-to-acceptance process, program administrative structure, and cohort model. Additional information about these elements is provided in Appendix F.

Recruitment-to-Acceptance Process

PluggedIn and WorkREADY! students followed a five-step process from recruitment to program acceptance; students who applied and were admitted were then selected to participate in specific pathways (i.e., PluggedIn or WorkREADY) based on their previous educational experience and educational needs.

Program Administrative Structure

PluggedIn and WorkREADY! staff at SWCC consisted of a project director, who is also the Dean of Business, Engineering, and Technology; a program coach; an adult career coach/employment specialist; an adult education lead; and program faculty and administrative staff members.

PluggedIn and WorkREADY! Cohort Model

The PluggedIn and WorkREADY! cohort model consisted of five components designed to provide students with continual support: a) industry-specific workforce classes, b) adult education courses, c) tutoring, d) coach support, and e) employer support. The experience of PluggedIn and WorkREADY! students differed from comparison students on an Associate's degree pathway with respect to program duration, course load, cohort structure, class schedule, career readiness support, support from coaches and tutors, and job support. Overall, in contrast to comparison students, PluggedIn and WorkREADY! students spent less time in their programs; enrolled in fewer classes at a time; took classes with the same cohort of students; were enrolled full-time; and received more explicit support in career, academic, and other areas. For additional information, see Appendix F, Table F1.

Implementation Fidelity

Because implementation fidelity is a multifaceted concept, evaluators used a research-based framework that examined program adherence (i.e., implementation as intended, content received, dosage), while also measuring other variables that could influence implementation fidelity, including quality (effectiveness of program delivery), participant responsiveness (level of student engagement and interest), and program adaptations or revisions (Carroll et al., 2007; Pérez et al., 2016). Evaluators used this framework to document implementation fidelity through the collection of several variables, such as the number of industry-specific workforce classes held and the level of student engagement (see Appendix G, Table G1). Overall, SWCC implemented the program with fidelity, adhering to the overall program structure and providing students with adequate dosage. SWCC also offered a high-quality program comprised of

engaged students and made several modifications where needed (see Table 2 for a summary of implementation fidelity findings from previous reports (Styers, Haden, Cosby, & Peery, 2015, 2016, 2017).

Table 2. Summary of implementation fidelity variables and findings, 2015–2017

Implementation Fidelity		
	Adherence	<ul style="list-style-type: none"> All students received instruction in career skills, soft skills, and digital literacy, and students received support from coaches or tutors. Only students in PluggedIn cohorts received adult education instruction from Southwest Regional Adult Education (SRAE) staff. Students in WorkREADY! received similar types of content (i.e., college survival skills, college success strategies, writing practice, and applied math) from SWCC staff. 25 employers participated in program planning or implementation. Students participated in 12 SWCC classes (industry-specific workforce classes, computer class, and career readiness course). 88% of students met individually with at least one coach. Coaches reported that they were able to address student needs and concerns in individual meetings 100% of the time. Instructors also met with 71% of students individually, often for academic, personal, or financial reasons.
Potential Moderators of Fidelity		
	Quality	<ul style="list-style-type: none"> Students found full-time classes and the cohort model to be beneficial. Program staff was seen as collaborative, supportive, and respectful and shared a passion for student success.
	Participant Responsiveness	<ul style="list-style-type: none"> Students asked questions and worked with other students in class. Many students reported being most engaged in hands-on labs.
	Program Adaptations	<ul style="list-style-type: none"> Staff made scheduling adjustments in response to student feedback. Staff purchased additional equipment and supplies using grant funds.

Sources: Focus Groups, Program Artifacts, Interviews, and Program Personnel Implementation Survey

There were also several areas of implementation strengths and challenges across the project years, which may provide useful considerations for future SWCC programs and other community colleges; see Table 3 for a summary of implementation strengths and challenges detailed in a previous report (Styers et al., 2017). For example, while SWCC found success recruiting students through a variety of recruiting methods, many of these methods became less effective over time and alternative options had to be considered.

Table 3. Summary of implementation strengths and challenges, 2015–2017

	Implementation Strengths	Implementation Challenges
	Recruitment process	<ul style="list-style-type: none"> Variety of recruitment methods (e.g., postcards, newspaper articles) Initial recruiting methods less effective over time (e.g., postcards)

	Implementation Strengths	Implementation Challenges
 Program design and structure	<ul style="list-style-type: none"> • Cohort model • Full-time classes • Hands-on learning • Embedded personal and financial supports 	<ul style="list-style-type: none"> • Condensed program time frame
 Employer collaboration	<ul style="list-style-type: none"> • Employer participation in career fairs, mock interviews, information sessions; job/internship offerings; support for field trips; guaranteed interviews for program completers 	<ul style="list-style-type: none"> • Difficulty communicating with employers due to employers' busy schedules, a poor local economy, and SWCC staff turnover
 Program retention	<ul style="list-style-type: none"> • Time clock feature to track attendance • Teacher strategies, such as harder in-class quizzes for late attendees • Supports to address students' needs (e.g., transportation, food) 	<ul style="list-style-type: none"> • Promoting higher student attendance, retention • Tracking student attendance
 Instructor and staff quality	<ul style="list-style-type: none"> • Highly collaborative, supportive staff • Regular communication to discuss student needs and ways to address them • United passion for student success in staff 	<ul style="list-style-type: none"> • No key challenges

Sources: Focus Groups, Program Artifacts, Interviews, and Program Personnel Implementation Survey

Program staff also made several modifications during the grant period based on their understanding of student needs. It may be helpful for SWCC and other community colleges to consider these changes as they develop and implement new programs. For a more in-depth summary of program modifications, see Styers et. al. (2017).

Program modifications, 2015–2017
<ul style="list-style-type: none"> • Condensed curriculum to fit program time frame • Used block scheduling to allow instructors to delve deeper into topics • Moved Career Readiness certificate to first semester and employer field trips and mock interviews to the second to focus on employment readiness in the first semester and allow students to see workplaces and apply learning in the second • Allowed extra time in labs based on student requests • Offered day and evening classes to accommodate student schedules • Offered non-credit courses in machining, welding, and mechatronics

Sources: Focus Groups and Program Personnel Implementation Survey

Program Outcomes and Impacts

This section contains data on PluggedIn and WorkREADY! student outcomes and impacts; it includes staff and student focus group data, data from the Student Academic Experiences and Student Retrospective surveys, SWCC institutional data, and statewide employment and wage data. We describe findings from this data regarding changes in student knowledge and career beliefs and readiness, as well as differences in academic achievement and completion, further education and academic interest, and employment and earnings. Each section begins with outcomes specific to participation in PluggedIn and WorkREADY! (i.e., treatment-only) and is followed by program impacts identified by examining differences between PluggedIn and WorkREADY! students and comparison students in similar programs. The section ends with an examination of SWCC achievement of DOL grant benchmarks (Table 4). A complete list of findings from statistical significance tests is in Appendix H.

Table 4. Summary of topics and findings

Student Outcome and Impact Highlights	
 Knowledge	<ul style="list-style-type: none"> PluggedIn and WorkREADY! students reported increases in workforce-specific skills, digital literacy skills, and job search and interview skills. These increases were statistically significant.
 Career Beliefs and Readiness	<ul style="list-style-type: none"> PluggedIn and WorkREADY! students' self-ratings indicated increases in their job search and career confidence. These increases were statistically significant. Employers believed treatment students were career ready.
 Academic Completion and Achievement	<ul style="list-style-type: none"> 81% of PluggedIn and WorkREADY! students attained at least one third-party credential and 61% completed the program. PluggedIn and WorkREADY! students odds of program completion were 3.5 times that of comparison students. PluggedIn and WorkREADY! students odds of third-party credential attainment were 8 times that of comparison students.
 Further Education and Academic Interest	<ul style="list-style-type: none"> 29% of PluggedIn and WorkREADY! completers furthered their education. PluggedIn and WorkREADY! students' odds of pursuing further education were not statistically different from comparison students.
 Employment and Earnings	<ul style="list-style-type: none"> At least 48% of PluggedIn and WorkREADY! students were employed within one month of completing their program; 92% of these students retained their employment 3–9 months later. At least 29% of employed PluggedIn and WorkREADY! students reported a wage increase after completing the program. PluggedIn and WorkREADY! students' odds of finding immediate employment were approximately 2.5 times that of comparison students. There were no statistically significant differences between treatment and comparison groups for employment retention or wage increases.

Student Outcome and Impact Highlights



DOL Grant Benchmarks

- SWCC met 5 of 9 grant benchmarks and nearly met an additional 2 benchmarks (program completion, 97% of target achieved; employment one month after program completion, 86% of target achieved).
- SWCC did not meet grant benchmarks for student retention or wage increases, according to available data.



Knowledge

In this section, evaluators explore student reports of knowledge gains from the Student Retrospective survey and focus group data. This section begins with findings specific to treatment students and then explores comparison student reports of knowledge gains. Because a small number of treatment and comparison students completed the Student Retrospective survey, these quantitative findings should be interpreted with caution.

PluggedIn and WorkREADY! knowledge outcomes

Evaluators conducted a paired samples *t*-test to examine differences in PluggedIn and WorkREADY! students' reports of knowledge before and after participating in the program. On a 10-point scale, ranging from 1 = *no knowledge* to 10 = *expert*, students reported improvements in their knowledge across all three areas—workforce skills, job application and interview skills, and digital literacy skills—and these improvements were statistically significant (see Figure 3).

PluggedIn and WorkREADY! students' workforce skills, job application and interview skills, and digital literacy skills statistically improved after completing SWCC courses.³



Figure 3. Treatment students' digital literacy skills and job search and interview skills before and after SWCC courses, on a 10-point scale, 2015–2018

Source: Student Retrospective Survey

In focus groups, students, staff members, and employers regularly commented on student knowledge gains during the PluggedIn and WorkREADY! program. Staff noted that treatment students entered with little to no knowledge of the material and left the program with a vast amount of knowledge. Staff believed that students who completed the PluggedIn and

³ Readers should use caution in interpreting findings due to small comparison and treatment sample sizes on the Student Retrospective survey.

WorkREADY! program left with the right skills to gain employment. As one staff member said, “They did really well in the mock interviews and employers that were there were impressed and said they would hire some of them. This was a good sign that they had gained the knowledge to get into an entry-level job in their field.”

Treatment students also reported gains in knowledge in focus group sessions and in other qualitative data sources. One student expressed this as, “My knowledge has grown so much . . . I went from zero to, it makes complete sense now.” Students also commented on the digital literacy component of the PluggedIn and WorkREADY! program, saying that they “found this helpful, it was simple stuff I didn’t know how to do, like a screen shot. I learned different tricks.” Students with previous work experience also acknowledged that they learned a great deal. One student commented, “I worked in machining and now I’ve learned a lot more stuff.”

Employers recognized the benefit of hiring PluggedIn and WorkREADY! program completers who enter jobs with a basic level of knowledge. One employer commented, “Even having the basic knowledge, then we can train them, and they become a really good employee. These students come in with basic training, and we can do so much more with them.”

Comparison student knowledge gains

Evaluators planned to conduct significance tests to compare differences in student knowledge gains by condition using data collected from the Student Retrospective survey. However, only three comparison students completed these questions on the survey (see Appendix C for additional information on response rates). As a result, evaluators descriptively examined comparison student data. Overall, all three comparison students reported gains in workforce knowledge, two of the three students reported small improvements in digital literacy skills, and one of the students reported a small improvement in their job search and interview skills.



Career Readiness

In this section, evaluators explored career readiness data from the Student Retrospective survey, Student Academic Experiences survey, and focus groups. Evaluators then examined comparison student reports of career readiness–related improvements. Because a small percentage of treatment (13%) and comparison students (5%) completed the Student Retrospective survey, these quantitative findings should be interpreted with caution.

PluggedIn and WorkREADY! career readiness outcomes

Across a series of retrospective survey questions, students rated their confidence in their job search and interview skills, everyday professional and soft skills, and 21st-century skills before and after taking SWCC courses. On average, treatment students reported increased confidence following SWCC courses in all three areas (see Figure 4). Paired samples *t*-tests revealed that these increases in confidence were statistically significant.

Overall, treatment students reported increases in confidence, personally and professionally.

PluggedIn and WorkREADY! students and staff commented on the tremendous confidence gains students experienced upon completion. Students felt confident in their personal abilities and their opportunities to secure employment. As one treatment student shared, “It brings your confidence way up. Once you know something it makes other stuff seem simple.” Another described increased confidence by saying, “I never would have thought I could do it. It makes you want to do more for yourself and be proud. It makes you feel good about yourself. It’s a skill nobody can take away from you.” Staff noted that the increases in treatment students’ confidence were very apparent. One staff member said, “By the time it’s all said and done, they are like, I can do this. At first they are unsure if they can do it, it seems tough, but as time goes on, their confidence builds.” Overall, treatment students were proud of their knowledge gains in the program and reported increased self-efficacy to secure employment upon program completion.

PluggedIn and WorkREADY! students, as a group, reported increased confidence in job application and interview skills, 21st century skills, and professional and soft skills in everyday life.⁴

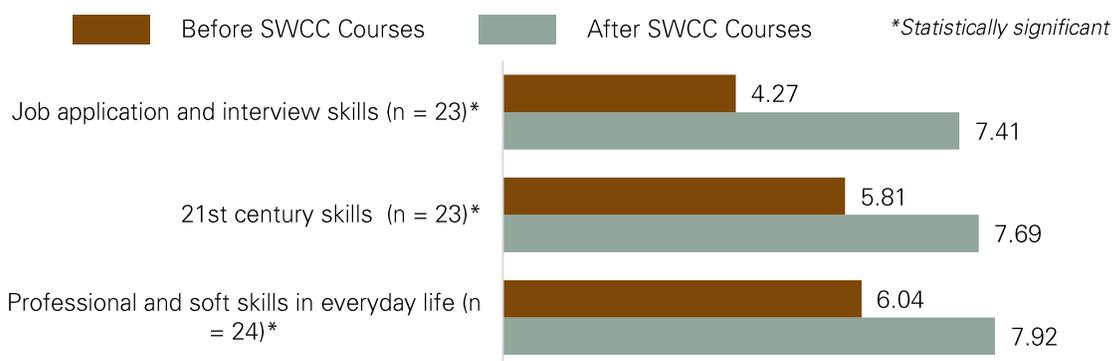


Figure 4. Treatment students’ confidence levels before and after SWCC courses, on a 10-point scale
Source: Student Retrospective Survey

Finally, treatment students reported that the PluggedIn and WorkREADY! program increased their motivation to pursue a career in advanced manufacturing. On a 5-point scale ranging from 1 = *very low motivation* to 5 = *very high motivation*, students reported low to average motivation to pursue a career before SWCC courses (Mean = 2.59) and high to very high motivation after courses were complete (Mean = 4.22, n = 22). A paired samples t-test revealed that this increase was statistically significant.

PluggedIn and WorkREADY! students also felt prepared for a career in advanced manufacturing after participating in the program. Treatment students rated their level of preparedness for a career in advanced manufacturing on a 5-point scale (ranging from 1 = *not at all prepared* to 5 = *very well prepared*) immediately after completing coursework. Ratings varied by cohort, with welding students feeling the most prepared, followed by machining/CNC students and mechatronics students. Carpentry students reported average preparation for their career. When the ratings were combined across PluggedIn and WorkREADY! program areas, students reported feeling *well prepared*, on average (see Figure 5).

⁴ Readers should use caution in interpreting findings due to small treatment student sample sizes on the Student Retrospective survey.

PluggedIn and WorkREADY! students reported feeling well prepared for careers in welding, machining, and mechatronics and prepared for careers in carpentry, on average.



Figure 5. Treatment student ratings of preparedness for a career in advanced manufacturing immediately after completing PluggedIn and WorkREADY! courses, on a 5-point scale (n = 113)

Source: Student Academic Experiences Survey

“Employers like that students started and finished something before they hire them. There is a big push for short-term programs, but employers locally like that someone committed to a six-month or one-year program. Even if they have to retrain them, they are willing to do that, because they know they can be trained and they started and finished something.”
 – Program staff

In focus groups, staff and employers commented on treatment students’ high level of preparedness for employment. For example, one staff member noted, “The [students] that we have worked with are ready to go to work. They interview well and have a great resume. They are ready. We get this feedback from on-the-job training.” After interacting with treatment students, employers shared that these students were ready for careers in advanced manufacturing, with one employer noting, “If you had everybody going through programs like this, we would have a better workforce.”

After finishing the program, most treatment students planned to find jobs in advanced manufacturing (71%) versus outside advanced manufacturing (17%). In focus groups, PluggedIn and WorkREADY! students reported that completing the program had increased their interest in their career fields and prepared them for employment. One treatment student shared, “I think it’s an all-around good program, how they try to get you ready for the job field. It’s a good program to get a career started.” Program graduates left the program confident in their abilities to secure employment. One PluggedIn and WorkREADY! student said, “[The program has] been really good for career readiness. We aren’t experts but we can definitely get a job.” Overall, treatment students generally reported that the credentials gained through the PluggedIn and WorkREADY! program had provided them the tools they need to secure employment.

Comparison student confidence related to career readiness

Evaluators planned to conduct significance tests to compare differences in student confidence improvements by condition, using data collected from the Student Retrospective survey. However, only three comparison students completed these questions (see Appendix C for additional information on response rates). As a result, evaluators descriptively examined comparison student data related to career readiness. Overall, all three comparison students reported minor improvements in confidence related to professional and soft skills, two students reported small improvements in their confidence related to job application and interview skills,

and two students reported small improvements in their confidence related to 21st-century skills.



Academic Completion and Achievement

In this section, evaluators examine academic completion and achievement by examining descriptive statistics for PluggedIn and WorkREADY! students and supporting data from focus groups with staff and students. Evaluators then examine program impacts on academic completion and achievement by conducting weighted binary logistic regressions and weighted independent samples t-tests to compare treatment and comparison student outcomes.

PluggedIn and WorkREADY Academic Completion Outcomes

Across the grant period, 61% of treatment students completed the PluggedIn and WorkREADY! program; 39% dropped out. This completion rate is higher than the SWCC college-wide graduation rate of 37% (Virginia Community College System, 2017). Of the 99 students who dropped out:

- 66% dropped for excessive absences,
- 13% dropped for personal reasons,
- 8% acquired a job,
- 5% switched cohorts,
- 4% had legal issues,
- 1% had medical issues, and
- 3% dropped out for other reasons.

81% of treatment students received at least one third-party credential and 61% completed their program.

All 153 PluggedIn and WorkREADY! students who graduated also attained an SWCC Career Studies Certificate (CSC) in their program area (e.g., welding, carpentry).

According to SWCC institutional data, 83% of all participating PluggedIn and WorkREADY! students completed at least one credit hour and 81% earned at least one third-party credential (see Appendix H, Table H-3).

“It gives employers proof that you know what you are doing, with the certifications. If someone comes off the street and says they are a machinist with no proof, but we have a bunch of certifications, proving we are qualified.”
— Program student

Staff, students, and employers noted PluggedIn and WorkREADY! benefits in boosting assessment scores and supporting credential attainment. SRAE adult education staff referenced increased assessment scores, noting that students who completed the program improved math and English scores. In addition, as one PluggedIn and WorkREADY! staff member reported, “Many of the students have made excellent grades. They worked hard and tried to achieve that. We contextualized the course as much as possible to make sure it is relevant to the field.” Treatment students noted that their success in obtaining credentials and certifications was evidence of their achievement and career readiness. The benefit extended to the job search; employers acknowledged that

treatment students who come in with requisite training have a leg up. As one noted, “Since they have NCCER, OSHA, and First Aid training, you don’t need to spend a lot of money up front when you hire them. Their applications go into a different pile.”

PluggedIn and WorkREADY! Academic Completion Impacts

Evaluators conducted three weighted binary logistic regressions to separately examine the impact of various factors on the odds that students would (1) complete their program of study, (2) drop out before program completion, and (3) attain at least one third-party credential. In each model, evaluators included final GPA, based on its relationship to community college completion and retention (Hawley & Harris, 2006; Nakajima, Dembo, & Mossler, 2012; Pruett & Absher, 2015; Stewart, Hun Lim, & Kim, 2015). Overall, when controlling for final GPA, PluggedIn and WorkREADY! students' odds of program completion were approximately 3.65 times that of comparison students, their odds of dropping out were 67% lower than comparison students, and their odds of attaining at least one third-party credential were 8.39 times that of comparison students. Sensitivity tests confirmed the robustness of these findings (see Table 5 and Appendix I).

PluggedIn and WorkREADY! students odds of program completion were 3.65 times that of comparison students

Table 5. Weighted binary logistic regressions predicting impacts of the PluggedIn and WorkREADY program on program completion, drop out, and attainment of third-party credentials

	B	S.E.	Wald statistic	df	p	Odds ratio
Program completion	1.30	.26	24.27	1	.00**	3.65
Program drop out	-1.11	.26	17.81	1	.00**	.33
Attainment of at least one third-party credential	2.13	.31	46.31	1	.00**	8.39

Note: * $p < .05$, ** $p < .01$.

Evaluators also conducted a weighted independent samples t -test to examine whether participating in the PluggedIn and WorkREADY! program impacted the number of third-party credentials attained by students. The analysis showed a statistically significant difference in credential attainment, revealing that PluggedIn and WorkREADY! students earned more credentials than comparison students (see Figure 6).

PluggedIn and WorkREADY! students earned a significantly greater number of third-party credentials than comparison students.

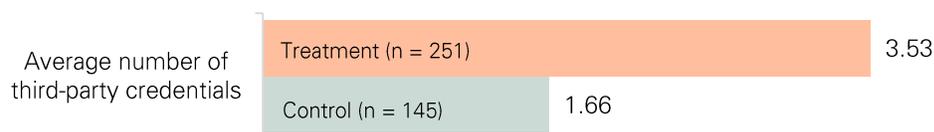


Figure 6. Average number of third-party credentials attained by treatment and comparison students. Source: SWCC Institutional Data.

Finally, evaluators conducted a weighted independent samples t -test to determine whether participating in the PluggedIn and WorkREADY! program impacted students' final GPA. There was not a statistically significant difference in GPA. On average, PluggedIn and WorkREADY! students who completed their programs had a similar GPA (Mean = 3.05, $SD = 0.58$) to comparison students who completed their programs (Mean = 3.15, $SD = 0.48$).



Further education and academic interest

In this section, evaluators examine PluggedIn and WorkREADY! students' interest in and pursuit of further education after completing programs through surveys, focus groups, and institutional data. Evaluators then examined the impact of the PluggedIn and WorkREADY! program on students' pursuit of further education by comparing treatment and comparison student pursuits of further education using a weighted binary logistic regression.

PluggedIn and WorkREADY! further education and academic interest outcomes

29% of treatment students who completed their program enrolled in further education at SWCC.

Many PluggedIn and WorkREADY! students were interested in pursuing additional education after completing the program. Several treatment students reported an interest in continuing school to achieve a high school diploma, Associate's (32%) or Bachelor's degree (4%), or both (6%); overall 42% ($n = 48$) of surveyed treatment students indicated being interested in continuing their education. According to SWCC institutional data, 29% of treatment

students enrolled in further education at SWCC after completing the PluggedIn and WorkREADY! program. This percentage suggests an encouraging rate of degree enrollment and attainment compared to national numbers on the six-year degree attainment rate for community college students enrolled in a certificate program. Specifically, within six years (2004–2009), 51% of students in a certificate program attained a certificate as their highest degree and 5% attained an Associate's degree (U.S. Department of Education, 2011).⁵

*"I went to college for two years and focused on things that weren't school. This made me realize I missed school. It made me want to keep going to school. When I first started, I saw all the opportunities that were available to me, I met the teachers and staff, and it made me aware of what opportunities I could take advantage of. That's why I have continued, after being made aware of the possibilities."
— Program student*

PluggedIn and WorkREADY! staff acknowledged that many treatment students planned to continue their education by pursuing an Associate's degree in advanced manufacturing, which included SWCC classes in mechatronics and machining/CNC. Program staff members noted that participating in PluggedIn and WorkREADY! is often an eye-opening experience for students. One staff member said, "Some of them get in here, and realize that it's doable with their life schedule, and they feel more confident and comfortable [pursuing further education]." Another program staff member stated "[Students receive] lot of good information from employers. One [student] in particular was going back and forth about getting an engineering degree, and the employers were saying, yes, finish it, we'd love to have you after that."

⁵ Evaluators reported only the percentage of PluggedIn and WorkREADY! student completers who sought further educational experiences at SWCC within the grant period. It is possible that students could have pursued further education beyond the timeframe of the grant or at other colleges or universities.

PluggedIn and WorkREADY! further education impacts

PluggedIn and WorkREADY! students' odds of pursuing further education were not statistically different from comparison students.

Evaluators conducted a weighted binary logistic regression to examine the impact of participation in the PluggedIn and WorkREADY! program and final GPA on the odds that students who completed their programs would pursue further education at SWCC. As noted previously, final GPA was included in the analysis, based on its relationship to community college completion and student retention (Hawley & Harris, 2006; Nakajima et al., 2012; Pruett & Absher, 2015; Stewart et al., 2015). Overall, when controlling for final GPA, PluggedIn and WorkREADY! student completers' odds of pursuing further education at the college was not significantly

different from comparison students who also completed their programs. Sensitivity tests confirmed the robustness of these findings (see Table 6, Appendix I).

Table 6. Weighted binary logistic regression predicting pursuit of further education at SWCC

	B	S.E.	Wald statistic	df	p	Odds ratio
Pursued further education after program completion	.00	.43	.00	1	1.00	1.00

Note: * $p < .05$, ** $p < .01$.



Employment and Wage Increases

In this section, evaluators explore institutional data on employment and wage increases for PluggedIn and WorkREADY! students. Evaluators then examine the impact of participating in the PluggedIn and WorkREADY! program on employment-related outcomes by conducting statistical significance tests to compare treatment and comparison groups using statewide employment and wage data.

PluggedIn and WorkREADY! employment outcomes

Overall, at least 48% of PluggedIn and WorkREADY students were employed within one month of completing the program; only 10% were not employed.⁶ Additionally, 92% of treatment students who identified as employed at the end of the program were still employed three to nine months later. Finally, at least 29% of employed treatment students reported wage increases after participating in the PluggedIn and WorkREADY! program.

⁶ SWCC did not have employment data for 43% of program completers ($n = 65$). As a result, employment percentages should be considered as approximate and may underestimate actual employment numbers.

PluggedIn and WorkREADY! employment impacts

Evaluators conducted a weighted binary logistic regression to examine the impact of the PluggedIn and WorkREADY! program on employment within one month of SWCC program completion. Overall, PluggedIn and WorkREADY! student completers' odds of finding employment within one month of completing their program were approximately 2.65 times that of comparison students who completed their programs (see Table 7). Sensitivity tests confirmed the robustness of these findings (Appendix I).

PluggedIn and WorkREADY! students' odds of finding immediate employment were 2.65 times that of comparison students

Table 7. Weighted binary logistic regression predicting employment within one month of program completion

	B	S.E.	Wald statistic	df	p	Odds ratio
Employment within one month of program completion	0.98	.43	5.19	1	.02**	2.65

Note: * $p < .05$, ** $p < .01$.

Evaluators also examined employment retention and wage increases separately using weighted chi-square tests.⁷ There was no statistically significant difference in employment retention rates or in wage increases by condition, suggesting that PluggedIn and WorkREADY! and comparison students had similar employment retention rates and a similar percentage of students in each group reported wage increases after completing their programs.



Summary of progress toward grant benchmarks

Of the nine benchmarks articulated in the original proposal to DOL, SWCC met five (see Table 8). For academic benchmarks, SWCC exceeded its goals for the total number of participants served by the programs, the number of participants completing credit hours and earning credentials, and the number of participants who enrolled in further education after completing the programs. SWCC nearly met the benchmark regarding the number of participants completing the program, but it did not meet their project target for number of participants retained in the program. For employment benchmarks, SWCC did not meet its benchmarks for the number of participants employed after completing the program or the number of participants who received wage increases, but it did meet the benchmark for the total number of participants retained in employment three to nine months after completing the program. It should be noted that SWCC did not have employment data for 65 program completers. As a result, employment and wage benchmarks should be considered as approximate and may underestimate actual employment numbers.

Table 8. Performance on the outcomes articulated in the SWCC DOL proposal

Benchmark	Outcome	Total Project Targets	Achieved	Percent of Target Achieved
1	Total participants served by PluggedIn and WorkREADY! programs	224	251	112%

⁷ Evaluators did not use weighted binary logistic regressions due to small sample sizes that resulted in a lack of model fit.

2	Total number of participants completing PluggedIn and WorkREADY! programs	157	153	97%
3	Total number of participants retained in PluggedIn and WorkREADY! program	31	1	3%
4	Total number of PluggedIn and WorkREADY! participants completing credit hours	179	208	116%
5	Total number of PluggedIn and WorkREADY! participants earning credentials	157	203	129%
6	Total number of participants enrolled in further education after completing PluggedIn and WorkREADY!	34	44	129%
7	Total number of participants employed after completing PluggedIn and WorkREADY!	85	73	86%
8	Total number of participants retained in employment 3–9 months after completing PluggedIn and WorkREADY!	63	67	106%
9	Total number of PluggedIn and WorkREADY! participants employed at enrollment who received wage increases after enrollment	36	21	58%

Source: SWCC Institutional Data

Summary

The PluggedIn and WorkREADY! program at Southwest Virginia Community College (SWCC) was well designed and well structured. Program staff provided a clear, five-step process from recruitment to program acceptance. The program also offered a unique five-component structure designed to support and engage students through industry-specific workforce classes, adult education courses, tutoring, coaching, and employer support.

Across the grant period, program staff largely adhered to the original program model. All students received core program components; 25 employers supported implementation. Students participated in 12 SWCC workforce and career classes, and coaches believed they could meet all student needs. Quality of delivery was reflected in the positive perceptions of the program shared by staff, students, and employers across five areas: program recruitment, program design and structure, employer collaboration, program retention, and instructor and staff quality. Participant responsiveness remained high across the grant period, according to staff and student reports, and students expressed high levels of engagement in both workforce and adult education courses. Finally, program staff sought to better address student needs by making several changes over the grant period based on formative findings from previous evaluation reports (e.g., switching adult education to block scheduling, offering evening classes).

PluggedIn and WorkREADY! students evidenced positive outcomes from their participation in the program. Students reported multiple knowledge gains, increased academic interest, greater confidence, and greater motivation to pursue an advanced manufacturing career following their participation. Students also completed the program at a rate surpassing the SWCC institution-wide graduation rate (61% for PluggedIn and WorkREADY! compared to 37% for SWCC as a

whole), and the majority of enrolled students attained at least one third-party credential (81%). Additionally, at least half of students (48%) were employed after completing the program, and the majority of those employed (93%) were retained by their employers three to nine months later. PluggedIn and WorkREADY! students also had greater odds of academic and employment success compared to comparison students. Specifically, their odds of program completion were approximately 3.5 times that of comparison students, and their odds of attaining at least one third-party credential were approximately 8 times that of comparison students. Additionally, PluggedIn and WorkREADY! students' odds of finding immediate employment upon program completion were approximately 2.5 times that of comparison students. By contrast, treatment and comparison students odds of pursuing further education were not statistically different and similar percentages of students in these groups were retained in their employment and reported wage increases after completing programs at SWCC.

These findings directly support SWCC in improving programs for future students, offering a promising direction and model for supporting positive academic, career, and skill-related outcomes for students. The findings may also be of interest to community colleges seeking models to improve academic and employability outcomes for their students, and particularly to rural colleges that serve large numbers of dislocated workers.

Based on the findings, we offer several recommendations for developing and implementing similar models at other community colleges:

- 1) *Plan for staff turnover.* PluggedIn and WorkREADY! saw several staff changes beginning midway through the grant, primarily due to the opening of new career positions at SWCC that were not grant dependent. To prepare for possible staff turnover, community colleges could keep a paper or online record of grant management roles and communications, including written policies and guidelines for different team members. For example, job coordinators could keep a detailed record of which employers they have contacted, and e-mail records and meeting notes could be shared with any new employee. Additionally, a document that details the role of the job coordinator and program policies or guidelines would be helpful. Community colleges could also follow the example set by SWCC and immediately involve new staff in ongoing staff meetings and collaborations to foster feelings of investment and support.
- 2) *Build a strong leadership and highly effective program management structure.* PluggedIn and WorkREADY! had a clear leadership and administrative structure that continually supported positive and open communication and information sharing among all staff. This type of regular information sharing may be a particularly important piece of an early warning system framework, allowing staff to monitor and share concerns regarding struggling students (e.g., Capps, 2012; Hawley & Harris, 2006; Pruett & Absher, 2015).
- 3) *Consider a cohort model.* The current study supports past research on the benefits of cohorts and learning communities for promoting feelings of community and connection among peers and staff (Bailey & Alfonso, 2005; Laanan, Jackson, & Stebleton, 2013). PluggedIn and WorkREADY! students reported that program staff created a positive and creative environment within cohorts, fostering information sharing, team building, and the development of positive relationships.

- 4) *Plan to offer career coaches and other support staff to students.* Our findings support research on the benefits of providing students with career and academic supports, such as helping students to build career goals (Simmons, 1995), providing tutoring (Goomas, 2014), and offering financial support (Davidson & Petrosko, 2015; Pruett & Absher, 2015). PluggedIn and WorkREADY! students greatly benefited from the availability of career and program coaches, who provided students with support in a wide variety of areas.
- 5) *Offer integrated developmental or remedial education as needed.* This study supported past research on the benefits of developmental or remedial education for adult students, who may appreciate contextualized and supportive communities and support services (Capps, 2012; David et al., 2015; Simmons, 1995). At the beginning of the grant, students had mixed feelings about SRAE developmental education and career readiness instructional components, but SWCC changed course to offer students a choice between PluggedIn and WorkREADY! pathways. These different pathways offered students the opportunity to receive more or less developmental education support, depending on their individual needs.
- 6) *Offer shorter-duration programs (e.g., 6 months).* A shorter-duration program may be particularly beneficial for dislocated workers, who may be more inclined to participate in a program that gets them back into the workforce more quickly (Simmons, 1995). At SWCC, the shorter-duration program may have had an initial impact. Program staff agreed that getting into the workforce faster may have been the original aim for many students, but staff also noted that several students took advantage of the stackable nature of credentials and continued their education beyond the six-month program.
- 7) *Nurture a small, community feeling in programs.* This may be an effect of the rural setting or of the cohort model (e.g., Bailey & Alfonso, 2005; Laanan et al., 2013), but there was an undeniable sense of community in the program at SWCC. Students and staff appeared united in supporting each other and helping one another grow. The overall mentality was that the group would grow stronger together; staff and students looked out for one another, promoting accountability and student confidence. One other factor may have resulted in this unique climate—many of the students in the program were older and already had some work experience; 74% of all SWCC students and 69% of comparison advanced manufacturing students were 24 or younger, compared to 35% of PluggedIn and WorkREADY! students (U.S. Department of Education, 2015). These older, more experienced students may have a different mentality and mindset toward furthering their education than younger students.
- 8) *Incorporate opportunities for students to visit local employers and job sites.* Students and staff regularly commented on the benefits of field trips to visit local work or job sites, such as Pepsi and SteelFab. These excursions offered students the opportunity to see advanced manufacturing in the real world and to talk with employers and build awareness of regional job opportunities (Stuart, Rios-Aguilar, & Dell-Amen, 2014). PluggedIn and WorkREADY! students may have experienced employment success because of these close partnerships with regional employers. For example, several students were hired after field trips to local employers or after participating in mock interviews.
- 9) *Build long-lasting relationships with regional employers.* As described in recommendation 8, PluggedIn and WorkREADY! students' employment success and

career readiness is likely partially due to the positive relationships built between SWCC and regional employers. Regional employers were invested in PluggedIn and WorkREADY! programs. Employers provided direct support in curriculum development and program monitoring through an advisory board, attended end-of-program Capstone presentations to learn about and support student achievements, taught some classes in the Carpentry program, and conducted mock interviews with students. Other community colleges should find ways to promote a high level of connectedness and collaboration with regional employers, beginning with the development of regional workforce advisory boards that provide ongoing insight and constructive feedback on program development and implementation. In this partnership, colleges should regularly collaborate with employers to promote needs-sensing between the two groups. Colleges should ask several questions and listen to employers' input: Is this program needed in my community, according to regional employers? How are students from my program/college doing in the workforce? How could we improve our offerings to better align with those needed by regional employers? Listening to employers' feedback on these questions and using it as a lens for program and course improvement would be key to this partnership (Mann, 2017; Southern Regional Education Board, 2012).

- 10) *If possible, find ways to fully cover program expenses.* As soon as SWCC received the Department of Labor TAACCCT grant, program staff examined every revenue stream in an effort to reduce students' financial burden. As a result, student tuition was fully covered by Pell Grants, Tobacco Region funds, or SWCC foundation funds. Program staff also purchased a set of classroom books that students could check out, so they did not need to purchase these resources. Certification and exam fees for students were fully funded as well. The project director estimated that the average cost to fully fund an individual student was \$7,000, on average, with welding and machining being more expensive than mechatronics. These program provisions may ultimately increase student retention by reducing financial stress and increasing financial well-being (Mukherjee, McKinney, Hagedorn, Purnamasari, & Martinez, 2016).

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Appendix A. PluggedIn and WorkREADY! Logic Model

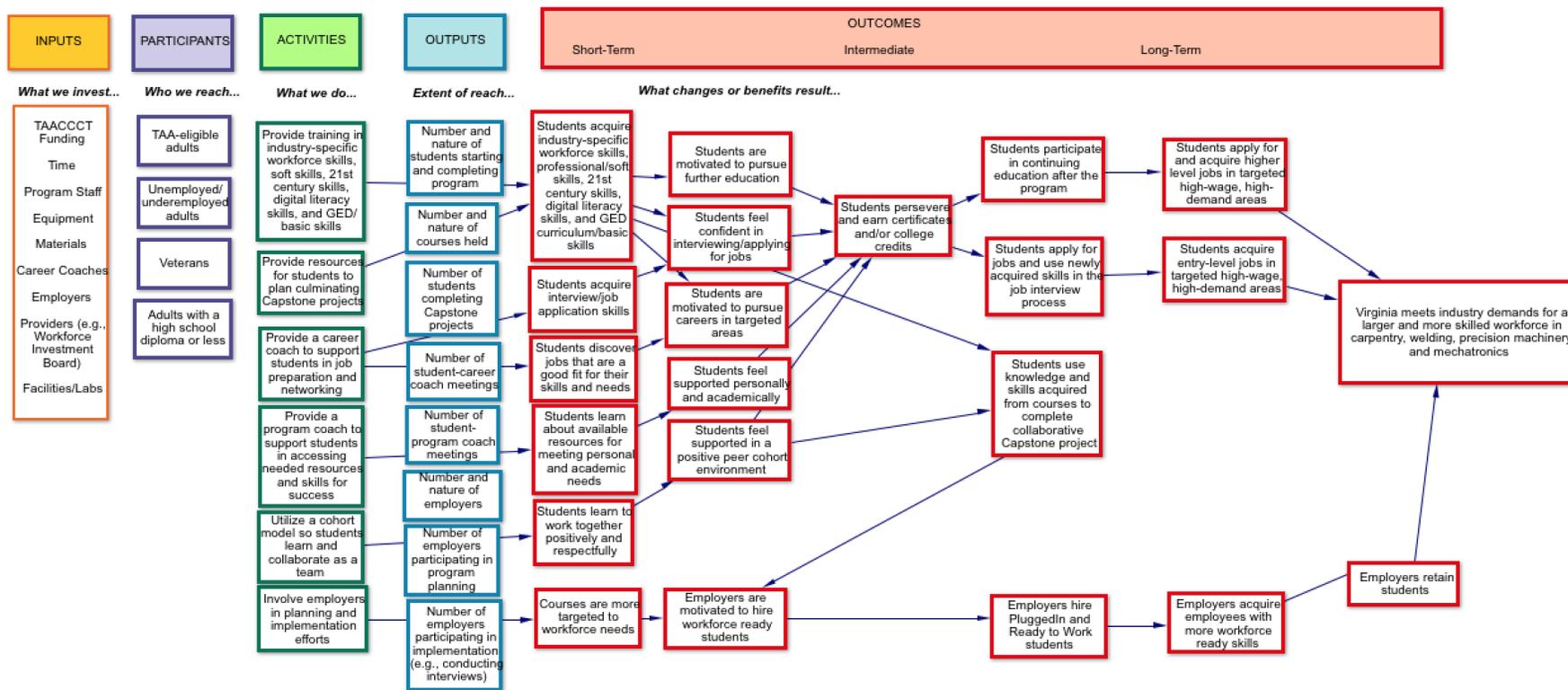


Figure A-1. Program logic model.

Appendix B. Summative Evaluation Design and Questions

The pool of treatment and comparison students consisted of groups of students enrolled during the grant period in the relevant majors at SWCC (welding, carpentry, machining/CNC, mechatronics). Once they entered any of these programs, students were tracked for at least one year (comparison students could take longer to finish their certification programs or degrees).

The comparison group may have included students who applied for the PluggedIn and WorkREADY! program but were not selected because of space limitations. In contrast to the treatment group, comparison-group students largely consisted of SWCC applicants who met the criteria for SWCC entry (e.g., Virginia Placement Test scores). These students were not prioritized for SWCC admission by skill deficiencies or TAA eligibility.

Due to small sample sizes on the Student Retrospective survey, it was not possible to confirm that no cross-contamination occurred. Evaluators have limited data from two comparison students, who both reported that they received academic and personal support from an academic advisor. One comparison student also received help with finances from SWCC. These students heard about potential job opportunities from an instructor or on their own.

To maximize the comparability of treatment and comparison groups, the quasi-experimental design used inverse probability of treatment weights (IPTW). This procedure uses propensity scores to create weights, resulting in a “pseudo population in which the covariates and treatment assignment are independent of each other” (Thoemmes & Ong, 2016, p. 41). When random assignment to study condition is not possible, IPTW provides a statistical method for balancing two nonequivalent groups on observed covariates, thus providing a more accurate understanding of the effect of a treatment, such as participation in PluggedIn and WorkREADY! (Thoemmes & Ong, 2015). IPTW also helps to account for selection bias by reducing multiple baseline covariates into a single score. This allows evaluators to account for potential confounders using a single covariate, resulting in analysis models with greater precision, similar covariate distributions, and more degrees of freedom (Adelson, 2013; Holmes & Olsen, 2010). Previous studies show that IPTW is an effective balancing technique when working with smaller sample sizes (Holmes & Olsen, 2010; Pirracchio et al., 2012). IPTW, unlike propensity score matching, also allows evaluators to retain all participants in the analysis (Adelson, 2013; Guo & Fraser, 2015; Thoemmes & Ong, 2016).

In calculating propensity scores, evaluators determined an appropriate set of pretest covariates that were not influenced by program participation. These included demographic variables and program area (e.g., welding, machining). These variables served as predictors in a binary logistic regression predicting treatment assignment for each individual in the dataset (Guo & Fraser, 2015). Once evaluators calculated individual propensity scores, they then calculated IPTWs using individual propensity scores and weighting by the inverse as described in Thoemmes & Ong (2016). For additional information, see Appendix E.

Appendix C. Data Strategies and Measures

The formative and summative evaluation of the PluggedIn and WorkREADY! program employed a variety of data strategies, listed below. To the extent possible, evaluators triangulated data from multiple measures to more fully understand program implementation and student outcomes.

Formative Evaluation

Formative evaluation measures included program artifact reviews; focus groups with staff members, students, and employers; interviews with program staff; an Academic Experiences survey; a monthly Coach Implementation survey; and a Program Personnel Implementation survey.

Program Artifact Review

Evaluators examined PluggedIn and WorkREADY! program artifacts, including program reports, meeting minutes, newsletters, work plans, and faculty evaluations. Evaluators examined 118 artifacts during the grant period.

Focus Groups

Evaluators conducted semiannual focus groups to gain a deeper understanding of implementation and to gather qualitative perceptions of program outcomes. Qualitative data from focus groups with program personnel informed program development and identified areas of potential strength or weakness. Similarly, focus groups with employers provided insight about employer involvement in the PluggedIn and WorkREADY! program and communicated employer perceptions of program strengths, weaknesses, and suggested areas for improvement. The student focus groups offered additional information on how students received the PluggedIn and WorkREADY! program, including student suggestions related to program strengths, weaknesses, and areas for improvement. Student focus groups also provided qualitative data regarding program impacts on student outcomes related to career readiness, academic and career interests, and academic achievement. Across three years of data collection, evaluators held six student focus groups, seven staff focus groups, and two employer focus groups, for a total of 15 focus groups. The focus groups engaged 35 students, 31 staff members, and 4 employers, for a total of 70 focus group participants across the three years.

Interviews

One of the lead evaluators interviewed the project director, the program coach, the career coach/employment specialist, and the adult education lead in the spring of 2015 to better understand program delivery and the supports provided to students (i.e., the support roles played by different individuals and differences in student experience for treatment and comparison students). Evaluators conducted four phone interviews with staff in spring 2015.

Surveys

Evaluators used three surveys to understand program implementation: a Student Academic Experiences survey, a Monthly Coach Implementation survey, and a Program Personnel Implementation survey.

Student Academic Experiences Survey. At the end of PluggedIn and WorkREADY! courses, evaluators surveyed students about the quality of support they received from staff (coaches, tutors, and instructors) and fellow students, their perceptions of program and career coaches, the program's strengths and areas that needed improvement, their ratings related to program engagement, their postcourse beliefs about career preparedness and plans, and their perceptions of PluggedIn and WorkREADY! classes (e.g., size, class time, class format, cohort model, what students liked, what students did not like, suggested areas for improvement). By the end of the study, 115 of the 153 students who completed the PluggedIn and WorkREADY! program took the Academic Experiences Survey (75% response rate).

Monthly Coach Implementation Survey. Evaluators surveyed the program coach and employment/career coach each month from October 2015 to July 2017 to track how many students met with coaches individually and whether coaches were able to support student needs; evaluators also sought to understand the types of support provided by coaches. Coaches completed 67 monthly surveys disseminated from January 2015 to July 2017 (100% response rate).

Program Personnel Implementation Survey. Evaluators surveyed program personnel three times a year to collect additional implementation and program design data related to lesson and course modifications or revisions, perceptions of student engagement for cohorts 4–10, use of grant funds, program involvement, employer involvement, information sharing among staff, program recruitment and training, and general perceptions. Program staff members completed 57 staff implementation surveys at six time points, out of 66 surveys disseminated (86% response rate).

Summative Evaluation

Summative evaluation measures included statewide and SWCC data, a Student Retrospective survey, outcome focus groups, and a Student Academic Experiences survey (assessing career plans).

Summative evaluation activities included (a) exploring how PluggedIn and WorkREADY! participation related to career and academic outcomes through focus groups, available state and institutional data, and surveys of PluggedIn and WorkREADY! students; (b) comparing student achievement related to career, skill-related, and postcollege outcomes between PluggedIn and WorkREADY! students and nonparticipating comparison students through focus groups, available state and institutional data, and surveys; and (c) tracking PluggedIn and WorkREADY! progress toward benchmarks 1–9 from the Solicitation for Grants Application and the original SWCC proposal. Benchmarks related to student enrollment, degree completion, and employment outcomes.

Statewide Employment Data and SWCC Institutional Data

Evaluators used available student-level SWCC and statewide employment data (collected 5–6 months after graduation) as indicators of student demographics (e.g., race/ethnicity, gender, age, income), academic outcomes (e.g., signing up for additional education, number of students earning credentials, number of students completing credit hours, number of students who did not complete the program, total participants served by the program), and employment data (e.g., average income, job retention, current employment status) for treatment and comparison students. Evaluators also used SWCC academic data and statewide employment data to assess progress toward DOL grant benchmarks for PluggedIn and WorkREADY! students. To protect student confidentiality, evaluators used ID numbers instead of student names for tracking purposes.

Student Retrospective Survey

Evaluators surveyed treatment and comparison students three months after course completion to assess various academic (e.g., course completion, performance, participating in further education), employment (e.g., career plans, career self-efficacy, wage increases, retained employment), and skill-related (e.g., self-efficacy in digital literacy, 21st-century skills) outcomes. This survey was retrospective to assess student perceptions of growth in these areas over time. Multiple studies suggest that retrospective surveys provide high internal validity and convenience with only one administration period (e.g., Cantrell, 2003; Pratt, McGuigan, & Katzev, 2000). These data were triangulated with data from statewide and institutional datasets.

A total of 26 PluggedIn and WorkREADY! students and 3 comparison students who completed their programs completed the Retrospective Survey. Evaluators sent the survey to all treatment students who completed their programs and to all comparison students, with multiple reminders for each population. However, comparison students were particularly difficult to access and incentivize to complete the online survey. Evaluators only allowed students who confirmed that they completed their programs to complete the survey, resulting in response rates of 17% for treatment students (26/153) and 5% for comparison students (3/62).

Student Focus Groups

Evaluators conducted focus groups with four types of treatment participants (students in welding, mechatronics, machining, and carpentry) to gather qualitative perceptions of program outcomes; 35 treatment students participated in focus groups across the grant period.

Student Academic Experiences Survey

Evaluators collected information related to treatment students' career beliefs (e.g., perceptions of career readiness, postgraduation plans) at the end of PluggedIn and WorkREADY! courses. By the end of the study, 115 PluggedIn and WorkREADY! students, out of a total of 153 who completed the program, completed the Academic Experiences survey (75% response rate).

Appendix D. Evaluation Time Frame

The evaluation milestones and data collection time frames corresponded to the start and end dates of the PluggedIn and WorkREADY! program at SWCC, including all 16 cohorts (see Tables D1–D4).

Table D- 1. Evaluation milestones and data collection time frames for 2015

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
1	Welding	—————												
				■ □ ◆	○					●	■			◎ ★
2	Carpentry	—————												
				■ □ ◆	○						■ ●			◎ ★
3	Welding	—————												
				■ □ ◆	○						■ ●			★
4	Carpentry											—————		
												◆		
5	Machining/CNC											—————		
												◆		

Key.

————— Cohort duration (Program artifacts and Monthly Coach Implementation Survey collected during this time frame)

Focus Groups and Interviews: ■ Focus Groups, □ Interviews

Surveys: ○ Program Personnel Implementation Survey, ● Academic Experiences Survey, ◎ Student Retrospective Survey

Data from SWCC: ◆ Demographic data collection, ◆ Academic and employment data collection

Reports: ★ Interim Evaluation Report 2015, ★ Final Evaluation Report

Table D-2. Evaluation milestones and data collection time frames for 2016

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
1	Welding			❖									★	
2	Carpentry			❖									★	
3	Welding	⊙		❖									★	
4	Carpentry	—————												
		○		■	●		⊙				❖		★	
5	Machining/CNC	—————												
		○		■	●		⊙				❖		★	
6	Mechatronics	—————												
		◆				○	●			⊙			★	
7	Welding	—————												
		◆				○	●			⊙			★	
8	Machining/CNC						—————							
							◆		○				■	●
9	Mechatronics						—————							
							◆		○				■	●
10	Carpentry						—————							
							◆	●	○				★	
11	Welding							—————						
											◆			
12	Machining/CNC							—————						
											◆			
13	Mechatronics							—————						
											◆			

Key.

————— Cohort duration (Program artifacts and Monthly Coach Implementation Survey collected during this time frame)

Focus Groups and Interviews: ■ Focus Groups, □ Interviews

Surveys: ○ Program Personnel Implementation Survey, ● Academic Experiences Survey, ⊙ Student Retrospective Survey

Data from SWCC: ◆ Demographic data collection, ❖ Academic and employment data collection

Reports: ★ Interim Evaluation Report 2016, ✪ Final Evaluation Report

Table D-3. Evaluation milestones and data collection time frames for 2017

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
6	Mechatronics	❖											★
7	Welding	❖											★
8	Machining/CNC						❖						★
9	Mechatronics						❖						★
10	Carpentry						❖						★
11	Welding	—											
		○●							❖				★
12	Machining/CNC	—											
		○	■●						❖				★
13	Mechatronics	—											
		○	■●						❖				★
14	Welding	—											
			◆				○		■●				
15	Machining/CNC	—											
			◆				○		■●				
16	Mechatronics	—											
			◆				○		■●				

Key.

— Cohort duration (Program artifacts and Monthly Coach Implementation Survey collected during this time frame)

Focus Groups and Interviews: ■ Focus Groups, □ Interviews

Surveys: ○ Program Personnel Implementation Survey, ● Academic Experiences Survey, ◎ Student Retrospective Survey

Data from SWCC: ◆ Demographic data collection, ❖ Academic and employment data collection

Reports: ★ Interim Evaluation Report 2017, ★ Final Evaluation Report

Table D-4. Evaluation milestones and data collection time frames for 2018

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
14	Welding			❖						
15	Machining/CNC			❖						
16	Mechatronics			❖						★ (all cohorts)

Key.

— Cohort duration (Program artifacts and Monthly Coach Implementation Survey collected during this time frame)

Focus Groups and Interviews: ■ Focus Groups, □ Interviews

Surveys: ○ Program Personnel Implementation Survey, ● Academic Experiences Survey, ⊙ Student Retrospective Survey

Data from SWCC: ◆ Demographic data collection, ❖ Academic and employment data collection

Reports: ★ Interim Evaluation Report 2018, ★ Final Evaluation Report

Appendix E. Analysis Procedures

A mixed-method design was used for the formative evaluation of the PluggedIn and WorkREADY! program. Mixed methods strengthen the evaluation design by allowing evaluators to triangulate findings from both qualitative and quantitative data sources, providing a more comprehensive understanding of program implementation and outcomes than can be obtained through either method alone (Patton, 2002; Creswell & Plano Clark, 2007).

To facilitate qualitative analyses, data were imported into Atlas.ti, a qualitative data analysis software that allows evaluators to divide data into segments, attach codes to the segments, and then find and display all instances of similarly coded segments for analysis (Miles & Huberman, 1994). This process helps organize data for more efficient analysis. Qualitative data were analyzed using the techniques of analytic induction (Erickson, 1986). Following a thorough review of the data record, evaluators generated a set of preliminary assertions (statements believed to be true based on the whole dataset) regarding the research questions. Next, evaluators refined these assertions and established whether each was warranted. Evaluators identified excerpts from the data record (descriptive statistics, nonparametric analysis, and quotes from qualitative data) that supported each warranted assertion and linked the assertions, themes, and findings to support analytic generalization (Glaser, 1978). Data segments, such as passages from interviews or descriptive statistics from survey responses, became instances or indicators that were organized and indexed. Particular attention was given to confirming instances that were generated by mixed data collection methods, following the assumption that assertions based on multiple data sources are more robust and persuasive than those based on a single data type. In this method, evaluators worked toward coherence of data, assertions, and findings.

Two evaluators were responsible for coding and analyzing data. A research assistant coded all qualitative data in Atlas.ti and held monthly calls with a co-lead evaluator to review codes, discuss emerging codes, and establish reliability of coding. For this report, a co-lead evaluator examined the Atlas.ti dataset for common themes related to implementation analysis research questions.

To support analysis of quantitative implementation-related survey data (i.e., Academic Experiences survey, Program Personnel Implementation survey), evaluators imported quantitative data into SPSS and calculated various descriptive statistics (such as frequency counts, ranges, means, and standard deviations), ANOVAs, and logistic regressions.

Because chi-square tests (Participants section, p. 6) revealed significant differences between treatment and comparison students for age, gender, and veteran status, evaluators calculated normalized difference scores. Normalized difference scores provide information about whether evaluators could control for these variables as covariates in a logistic regression model or other corrective measures would be needed (Guo & Fraser, 2015). Normalized difference scores were defined as $\Delta x = (X_1 - X_0) / (\sqrt{S^2_0 + S^2_1})$, where X_1 and X_0 are the sample mean values for the treatment and comparison group and S^2_1 and S^2_0 are the sample mean values for the treatment and comparison group. Because all normalized difference scores were above .25 (.33 to .55), selection bias existed (Guo & Fraser, 2015); hence, evaluators used inverse propensity score weighting (inverse probability of treatment weights [IPTW]) in subsequent impact analyses.

IPTW does not require a continuous outcome variable and allows evaluators to retain all treatment and control participants in the analysis (Guo & Fraser, 2015; Thoemmes & Ong, 2016). IPTW uses propensity scores to create weights, resulting in a “pseudo-population in which the covariates and treatment assignment are independent of each other” (Thoemmes & Ong, 2016, p. 41).

To calculate IPTWs, evaluators first conducted a binary logistic regression to calculate the predicted probabilities of treatment assignment for each individual in the dataset—in other words, the propensity score (Guo & Fraser, 2015). The model included ethnicity, age, gender, SWCC program (i.e., mechatronics, welding, carpentry, machining), veteran status, and financial aid status. The full model was statistically significant $\chi^2(8, N = 396) = 119.172, p < .001$ and predicted adequate variance in treatment assignment (Cox and Snell $R^2 = .26$, Naglkerke $R^2 = .35$). Finally, based on an inspection of Cook’s influence statistics, DfBeta’s, and the Hosmer and Lemeshow tests, $\chi^2(8, N = 396) = 13.24, p = .10$, the model fit the data.

To calculate the IPTWs, evaluators calculated inverse propensity scores. Specifically, evaluators calculated stabilized weights, which divide the proportion of participants in the treatment group by the propensity score for those in the treatment condition, $P(Z = 1)/P(Z=1|X)$, and the proportion of participants in the control group by 1 minus the propensity score for those in the comparison condition, $(1-P(Z = 1))/(1-P(Z = 1|X))$. Evaluators then truncated weights below the 5th percentile and above the 95th percentile through recoding (Thoemmes & Ong, 2016).

To assess balance on covariates after weighting (see Guo & Fraser, 2015), evaluators conducted two separate weighted binary logistic regressions predicting veteran status and gender and one weighted regression predicting age, with all three regressions using condition as the dependent variable. Weighting removed imbalances for age ($p = .40$) and veteran status ($p = .07$), but not for gender ($p = .01$). However, given the small number of females in the study sample and limited number of potential variables to include in a propensity score, evaluators used the previously estimated IPTW in subsequent analyses. Evaluators also ran the models with gender included as an additional covariate, but gender was never a significant predictor and the results remained robust. As a result, evaluators did not include gender as a separate covariate in the primary impact analyses.

In each weighted binary logistic regression analysis, evaluators confirmed model fit based on inspection of Cook’s influence statistics, dfBetas, casewise residuals, and Hosmer and Lemeshow chi-square tests.

Finally, evaluators conducted sensitivity analyses to test the robustness of primary impact analysis findings by examining whether the findings were influenced by analytic decisions made by the evaluators or by the analytic methods used. More specifically, evaluators used sensitivity analyses to test the robustness of the primary impact estimates to the use of IPTWs and the inclusion of a final GPA covariate. Appendix J details the complete results from these analyses.

Appendix F. Additional Information on Implementation: Process and Structure

PluggedIn and WorkREADY! followed a 5-step recruitment-to-acceptance process (see Figure F- 1).

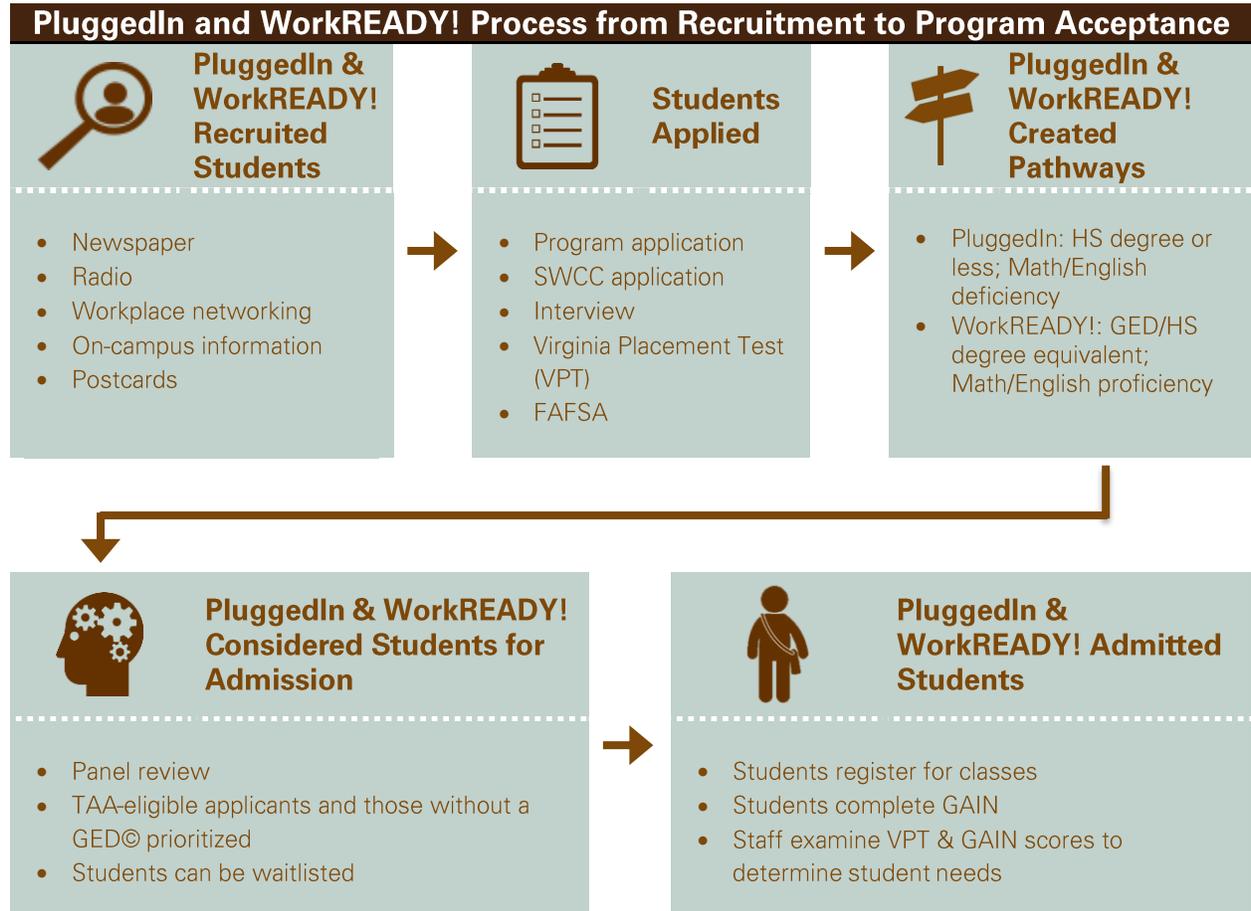


Figure F- 1. PluggedIn and WorkREADY! process from recruitment to program acceptance



PluggedIn and WorkREADY! program recruited students.

Three months before each PluggedIn and WorkREADY! student cohort began, SWCC conducted a multipronged recruitment effort that included newspaper articles, radio commercials, workplace networking, on-campus information, and postcards sent to households in the SWCC region. Students in all cohorts surveyed⁸ reported that they heard about the program in the following ways:

- Heard about it from a friend (39%)
- Read about it on the SWCC website (13%)
- Received a postcard in the mail (20%)
- Read about it in the newspaper (5%)
- Heard about it on the radio (1%)
- Other (31%)

Other ways students learned about the program included hearing about PluggedIn and WorkREADY! when they enrolled at SWCC; from a program coach, career coach, instructor, or probation officer; in the workforce; from a job fair at SWCC; from being employed at SWCC; from a relative who received a program postcard; from their GED class; from flyers posted at a bank or on a pizza box; or from outside agencies such as Rapid Response, the Department of Social Services, and the local unemployment office.



Students applied.

Students who were interested in the program could apply to participate. The application process consisted of a PluggedIn and WorkREADY! application, an SWCC admission application, an interview with the program coach, and completion of the Virginia Placement Test (VPT) and the Free Application for Federal Student Aid (FAFSA). SWCC used interviews to determine whether applicants had the necessary attitude and drive to complete the program. During interviews, the program coach asked students about home situations, childcare concerns, and other issues that might affect student success. Staff members also asked students about their responsiveness to embedded program support services, including personal, academic, and career supports.



PluggedIn and WorkREADY! created pathways.

SWCC tracked students into the PluggedIn or WorkREADY! program based on previous educational experience and scores on the Virginia Placement Test. Students who did not have a GED were tracked into PluggedIn and supported in attaining their GED. Students with a GED or high school degree were tracked into PluggedIn if their VPT scores showed that they were deficient in math and English. Students with at least a GED who demonstrated proficiency in one or both areas on the VPT were tracked into the WorkREADY! program.

⁸ No students from Cohort 4 completed the Student Academic Experiences survey.



PluggedIn and WorkREADY! considered students for admission.

A panel of at least three members of the program staff⁹ reviewed each student application and received feedback from the program coach in deciding about admission. TAA-eligible applicants and applicants without a GED[®] received the highest priority. Students with a deficiency in a skill area on the VPT received the next highest priority. If there was an issue with cohort timing or space availability, students who were not admitted could be added to a waiting list.



PluggedIn and WorkREADY! admitted students.

Students who were accepted to the program registered for classes and completed the General Assessment of Instructional Needs (GAIN) during the first week of class. SWCC used GAIN as a placement test to measure instructional needs at various levels. Instructors then used a combination of GAIN and VPT scores to determine where students needed support, creating an informal Individualized Education Plan (IEP) for each student. The goal was to improve math and reading skills so students will not require separate developmental education courses. Students who needed a high school diploma were put on a GED[®] track.

Overall, staff found GAIN and VPT scores to be valuable in assessing students' initial skill levels. Program staff used the results

- To identify specific skill gaps,
- To plan course implementation (e.g., identified a need for extra instructors when student skill levels on a topic varied widely), and
- To evaluate students' readiness for the GED[®] assessment (if applicable).

Program Administrative Structure

Figure F- 2 details the PluggedIn and WorkREADY! administrative structure. To clarify roles and responsibilities, evaluators asked program staff members in 2015 about their levels of program involvement in various areas (see Table F- 1). The project director was most involved in achieving program sustainability, leveraging resources, and overseeing program management and design. Leveraging resources involved using available resources to help students meet personal and academic needs (e.g., working to meet transportation needs, supporting students in getting financial aid, working with the Department of Social Services or the Virginia Department of Corrections). Program management responsibilities included offering ideas, assisting instructors, coordinating additional events (e.g., field trips), and supervising the adult education instructors in the program. The project director had little direct involvement in student training.

PluggedIn and WorkREADY! coaches (program coach, career coach/employment specialist, adult education lead) reported the highest levels of involvement in achieving program sustainability, recruitment, program management, and leveraging resources. To support program sustainability, the career coach/employment specialist encouraged students in working

⁹ The committee typically included at least three of the following individuals: the project director, an adult education lead instructor, a program coach, an adult career coach/employment specialist, and an administrative staff member.

toward their career and academic goals and maintaining positive relationships with employers. The program coach focused on recruitment, retention, and employment. The adult education lead supported the development of sustainability strategies at monthly and quarterly meetings. For recruitment, coaches reported actively seeking students through various avenues, including word of mouth and postcards. Adult education staff designed and distributed postcards for regional recruitment.

Table F- 1. Levels of program involvement for PluggedIn and WorkREADY! staff

Area	Project Director	Coaches/Adult Education Lead	Instructors	Assistants
Achieving program sustainability	✓	✓	✓	✓
Leveraging resources	✓	✓	✓	✓
Program management	✓	✓	✓	✓
Student training	✗	✓	✓	✗
Recruitment	✓	✓	✓	✓
Curriculum development	✓	✓	✓	✓
Program design	✓	✓	✓	✓

Key: ✓ Full/high involvement, ✓ Somewhat/limited involvement, ✗ Not involved.

There were two staff transitions in October/November 2016. Both program coaches left for other positions, and two new program coaches were hired.¹⁰

Instructors reported the highest levels of involvement in student training, and program assistants claimed midlevel involvement across all areas. Instructors shared that they were primarily responsible for student training, but they also had input in other areas of the program. For example, some of the adult education instructors supported recruitment by actively recruiting students in their GED® classes. Program assistants typically served in support roles for all areas of the grant. For example, assistants supported the coaches in recruiting students, discussed the program in weekly team meetings, and helped collect information for quarterly reports.

Program staff members worked together as a team, viewing the contributions of each individual as beneficial. During interviews and focus groups, program staff emphasized their helpful collaborations with Southwest Regional Adult Education (SRAE), who provided the instructors for the Adult Education program components (e.g., GED, soft skills, career readiness). Program staff also referenced the benefits of working with employers who provided helpful feedback on needed employee skills, served on advisory committees, hosted field trips, conducted mock interviews, participated in career fairs, and interviewed PluggedIn and WorkREADY! graduates.

¹⁰ In 2016, SWCC added an additional program coach to support student recruitment, retention, and job placement. The new program coach also monitored implementation to ensure the PluggedIn and WorkREADY! program was consistently implemented.

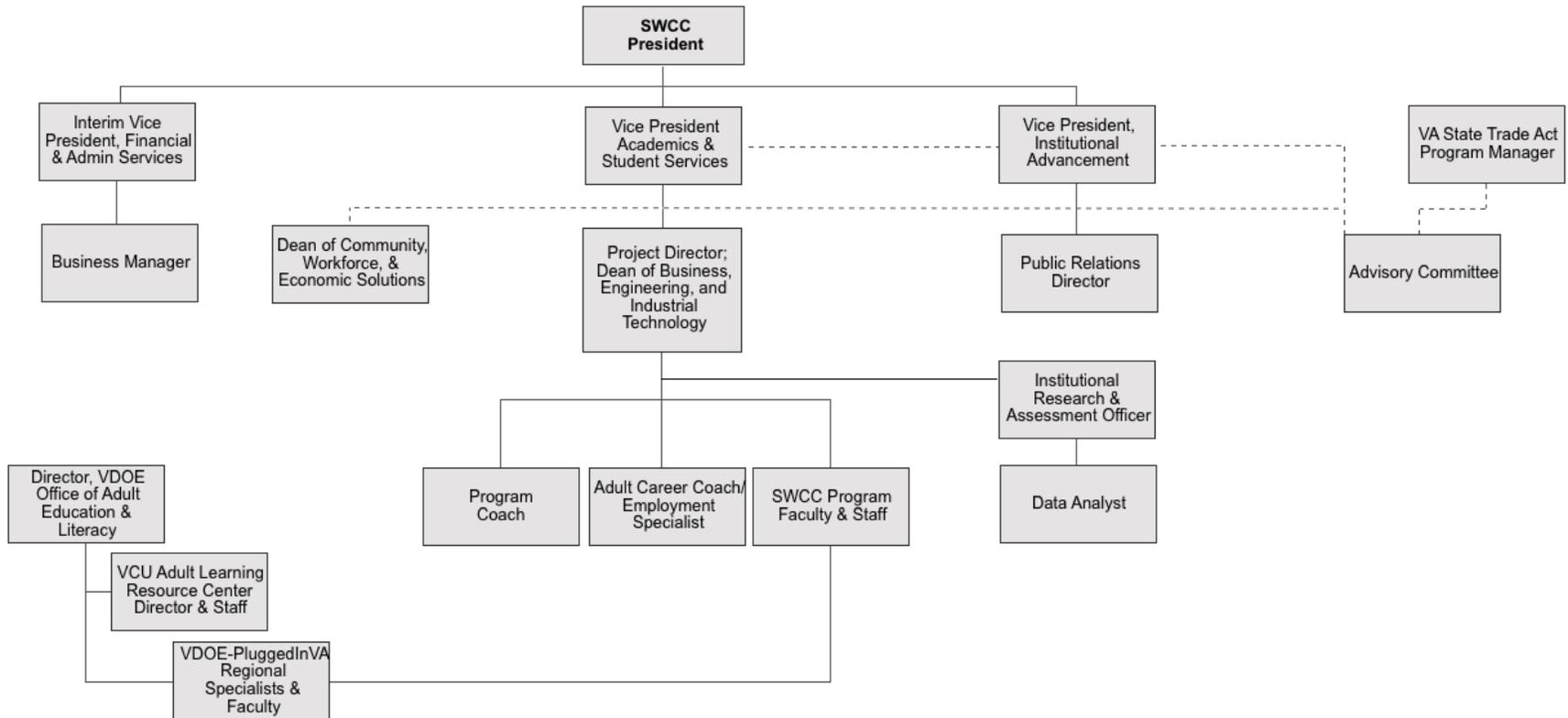


Figure F-2. PluggedIn and WorkREADY! administrative structure at Southwest Virginia Community College

The Cohort Model

The PluggedIn and WorkREADY! cohort model is comprised of five components (see Figure F-3).

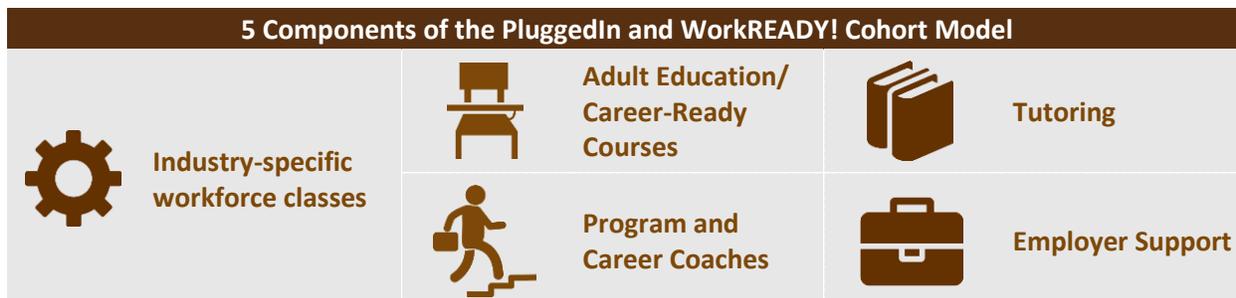


Figure F-3. Components of the PluggedIn and WorkREADY! model

 Students participated in industry-specific workforce classes, adult education, and career-ready courses.

PluggedIn and WorkREADY! students completed six months of cohort-based training in the areas of industry-specific workforce education, adult education (PluggedIn students only), and career readiness (all students). Each group of students participated in identical coursework for the full six months, three days a week from 8 a.m. to 4 p.m. or four days a week from 5 p.m. to 10 p.m. Some classes followed a hybrid model in which students learned about content through online modules (delivered via Blackboard) and came to class for hands-on work.

For PluggedIn cohorts, Monday classes were typically in adult education/career-ready courses, which followed a block schedule, covering the same topics across multiple weeks in the semester. Career readiness and mathematics were covered in the first semester and business etiquette and English in the second semester. The other two days consisted of instruction in industry-specific courses. In the WorkREADY! cohorts, students received approximately two hours of career-ready coursework each week and spent the rest of the time in industry-specific courses.

At the end of the program, all students completed a Capstone project that required them to synthesize learning from coursework into a final team project. Students presented their Capstone projects and summarized their educational experiences at an end-of-program event that included area employers, friends, and family members.

 Students received tutoring support.

The program included a built-in support system for students who fell behind. PluggedIn and WorkREADY! program staff monitored students' academic progress through databases and various information-sharing activities, including informal discussions and formal roundtable meetings. Staff then arranged for students who struggled or needed additional support to receive individual tutoring.



Students received support from program coaches and a career coach.

SWCC provided support to PluggedIn and WorkREADY! students through program coaches and a career coach. Program coaches supported students in resolving any issues that might interfere with their success. For example, coaches assisted students in finding childcare, resolving transportation issues, and negotiating personal expenses. Coaches also offered academic counseling and advice (e.g., on the importance of attending class or focusing on classwork). To encourage persistence, coaches visited classrooms on a regular basis to check in with students. When a coach identified a problem, he or she spoke with the student to offer support and assistance.

The career coach/employment specialist met student needs and enlisted employer support, primarily by functioning as a liaison between students and potential employers. As students entered the program, the career coach conducted informal needs assessments, identifying students' workforce interests, and then utilized multiple resources (e.g., networking connections with area employers) to support students in finding an ideal career fit. Throughout the program, the career coach aided students through one-on-one interactions and supported students in identifying career plans, writing résumés, practicing for job interviews, and finding potential employers.



Employers supported PluggedIn and WorkREADY! development and implementation.

Employers participated in course design and attended the year-end Capstone presentations. Employers also participated in career fairs at the college, conducted formal and informal interviews with PluggedIn and WorkREADY! students, hired program graduates, and provided feedback to SWCC on student hires.

Comparison to other SWCC programs

The experience of PluggedIn and WorkREADY! students differed from comparison students on an Associate's degree pathway with respect to program duration, course load, cohort structure, class schedule, career readiness support, support from coaches and tutors, and job support (see Table F- 2).

Table F-2. Differences between comparison programs and PluggedIn and WorkREADY!

		Comparison Students (Associate's degree track)	PluggedIn and WorkREADY! Students
	Duration	1–2 years	6–7 months
	Course load	3–4 classes simultaneously	1 class at a time
	Cohort structure	No—Students take classes with different students	Yes—Students take classes with the same group of peers
	Class schedule	Part-time—Classes at various times throughout the day and week	Full-time—Classes on a set schedule
	Additional support in career readiness	Yes—Limited* instruction in soft skills, digital literacy, and applied math	Yes—Multiple weeks of adult education, soft skills, digital literacy, and applied math instruction
	Additional support from coaches	Yes—Limited support through success coaches; less individualized	Yes—Individualized support from a dedicated career coach and program coach
	Tutoring support	No—Tutoring not embedded within the program	Yes—Tutoring embedded within the program
	Job support	Some—Welding students may find out about job opportunities from instructor	Yes—SWCC reaches out to employers for students and instructors inform students about job opportunities

* Comparison students seeking a welding diploma complete a course in applied math. Additionally, all comparison students seeking a career studies certificate take an introductory class related to job preparation, job searching, and résumé writing. These students receive more of a career readiness overview than PluggedIn and WorkREADY! students, who receive more individualized and comprehensive career readiness support (e.g., mock interviews, one-on-one résumé writing support).

Appendix G. Additional Information on Implementation Fidelity

Table G- 1. Implementation fidelity variables

Implementation Fidelity Category	Variables
Adherence	<ul style="list-style-type: none"> • Number and nature of employers • Number of employers participating in program planning • Number of employers participating in implementation (i.e., teaching classes) • Student participation in/receipt of program activities (e.g., adult education courses, soft skills, digital literacy skills, coach/mentoring support) • Number and nature of industry-specific workforce classes • Number and nature of SRAE adult education classes • Number and nature of PluggedIn and WorkREADY! student-career coach/employment specialist meetings • Number and nature of PluggedIn and WorkREADY! student-program coach meetings
Quality	<ul style="list-style-type: none"> • Staff perceptions of program quality (e.g., strengths, weaknesses) and areas for improvement • Student perceptions of program quality (e.g., strengths, weaknesses), areas for improvement, types and quality of support, and program structure • Employer perceptions of program quality (e.g., strengths, weaknesses)
Participant responsiveness	<ul style="list-style-type: none"> • Staff reports of student engagement • Student reports of engagement and interest
Program differentiation	<ul style="list-style-type: none"> • Staff reports of lesson modifications and revisions (including grant-funded revisions)

Table G-2. Program dosage (PluggedIn vs. WorkREADY! additional courses/instruction)

Topic/Course	PluggedIn	WorkREADY!
College Survival		
Understanding learning styles/personality	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Learning test/note-taking skills	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Creating and setting SMART goals	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Learning reading strategies	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Developing individual education and career plans	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Professional Success		
Taking responsibility for own actions	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Focusing on personal growth and improvement	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Appropriate business etiquette/dress	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Navigating business gifts/events	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Appropriate table manners	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Roles and interactions in the workplace	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
“Customer is right”	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Working and collaborating with others/team work	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Effective verbal and written communication	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Enthusiasm/attitude	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Searching and applying for jobs	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Job interviews/mock interviews	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Preparing for WorkKeys assessment	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Professionalism	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Networking	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Problem solving and critical thinking	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Practical writing		
Understanding audience/purpose	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Exploring ideas/information	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Composing, revising, and editing	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Writing essays	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Giving an oral report	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Résumé and cover letter writing	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Applied math for advanced manufacturing		
Using a calculator	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Word problems	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Decimals	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Whole numbers and fractions	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Ratio and proportion	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Percent	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Measurement	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Basic geometry	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Data analysis, statistics, and probability	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Basic algebra	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Applied Mathematics on KeyTrain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Table G-3. *PluggedIn and WorkREADY! courses*

	Welding	Carpentry	Machining/CNC	Mechatronics
Number of industry-specific workforce classes	10	10	10	10
Nature of industry-specific workforce classes	SAF 127 Industrial Safety BLD 215 OSHA Construction Safety WEL 117 Oxyacetylene Welding and Cutting WEL123 Arc Welding WEL 130 Inert Gas Welding WEL 160 Gas Metal Arc Welding WEL 150 Welding Drawing and Interpretations WEL 126 Pipe Welding WEL 129 Piping and Fabrication WEL 141 Welder Qualifications Test	SAF 127 Industrial Safety BLD 215 OSHA Construction Safety BLD 110 Introduction to Construction BLD 131 Carpentry & Framing BLD 111 Blueprint Reading and the Building Code BLD 132 Carpentry & Framing II BLD 147 Principles of Block and Bricklaying I ENV 193 Students in your Role in the Green Environment BLD 140 Principles of Plumbing Trades BLD 135 Building Construction Carpentry	SAF 127 Industrial Safety MAC 121 Numerical Control I MAC 122 Numerical Control II MAC 150 Intro to Computer-Aided Manufacturing MAC 161 Machine Shop Practices I MAC 162 Machine Shop Practices II MAC 163 Machine Shop Practices III MAC 164 Machine Shop Practices IV DRF 161 Blueprint Reading MTH 103 Applied Technical Mathematics	SAF 127 Industrial Safety ITE 115 Introduction to Computer Applications and Concepts MEC 140 Introduction to Mechatronics MEC 155 Mechanisms MEC 165 Applied Hydraulics, Pneumatics, and Hydrostatics MEC 230 Mechatronic Process Control IND 160 Introduction to Robotics ETR 113 D.C. and A.C. Fundamentals ETR 286 Principles and Applications of Robotics IND 243 Principles and Applications of Mechatronics
Other classes	2	2	2	2
Nature of other classes	ITE 102 Computers and Information Systems SDV 106 Preparation for Employment	ITE 102 Computers and Information Systems SDV 106 Preparation for Employment	ITE 102 Computers and Information Systems SDV 106 Preparation for Employment	ITE 102 Computers and Information Systems SDV 106 Preparation for Employment

Appendix H. Additional Information on Outcomes

Table H- 1 presents means and statistical significance tests based on Student Retrospective Survey data.

Table H- 1. Descriptive statistics and significance tests for PluggedIn and WorkREADY! students knowledge and skills

	Before SWCC Courses			After SWCC Courses			Mean Difference	Paired samples t-test results		
	n	Mean	SD	n	Mean	SD		t	df	Sig.
Workforce Skills	24	3.00	2.10	24	7.05	1.34	4.05	10.49	23	.00
Digital Literacy Skills	25	6.55	2.14	25	8.11	1.49	1.56	5.18	24	.00
Professional and Soft Skills	24	6.04	1.97	24	7.92	1.72	1.88	5.51	23	.00
21st-Century Skills	23	5.81	1.98	23	7.69	1.87	1.88	5.48	22	.00
Job Search and Interview Skills	23	4.46	2.09	23	7.59	1.67	3.13	7.24	22	.00
Confidence in Job Search and Interview Skills	23	4.27	2.46	23	7.41	1.78	3.14	6.55	22	.00
Career Motivation	22	2.59	1.30	22	4.18	0.85	1.59	6.11	21	.00

Source: Student Retrospective Survey

Table H- 2 details credentials earned by PluggedIn and WorkREADY! program participants.

Table H- 2. Credentials earned by enrolled PluggedIn and WorkREADY! students

All (n = 251)	n	%
Microsoft Digital Literacy Certificate	111	44%
ACT WorkKeys National Career Readiness Certificate	126	50%
OSHA 10	153	61%
OSHA 30	24	10%
First Aid	174	69%
Welding, Carpentry & Mechatronics (n =203)	n	%
NCCER: Core	67	33%
Carpentry (n = 23)	n	%
Role in Green Environment	14	61%
NCCER Carpentry Level 1	15	65%
NCCER Carpentry Level 2 (residential and/or commercial)	17	74%
NCCER Masonry Level 1	16	70%
Mechatronics (n = 68)	n	%
Siemens Level 1	17	25%
Precision Machining (n = 48)	n	%
NIMS: Measurement, Materials, and Safety	28	58%
NIMS: Job Planning, Benchwork, and Layout	19	40%
NIMS: Drill Press	2	4%
NIMS: Manual	4	8%
NIMS: CNC Milling Operations	13	27%
NIMS: CNC Turning	8	17%
NIMS: Turning Operations: Turning Between Centers	4	8%
NIMS: Turning Operations: Turning Chucking Skills	3	6%
Welding (n = 112)	n	%
NCCER Welding Level 1	13	12%
NCCER Welding Level 2	9	8%
FCAW-1G	1	1%
FCAW-3G	5	4%
FCAW-4G	1	1%
GMAW-2G	8	7%
GTAW-3G	1	1%
GTAW-4G	0	0%
SMAW-3G	5	4%
SMAW-4G	0	0%
SMAW-6G	1	1%

GTAW-1G	1	1%
Total Credentials and CSCs (n = 251)	n	%
Earned at least one third-party credential	203	81%
Earned a CSC (Graduates only)	153	61%

Source: SWCC Institutional Data

Table H- 3 through Table H- 10 provide results of the weighted binary logistic regressions, weighted independent samples *t*-tests, and chi-square tests.

Table H- 3. Weighted binary logistic regression results predicting program completion status

	B	S.E.	Wald statistic	df	<i>p</i>	Odds ratio
Condition	1.30	.26	24.27	1	.00**	3.65
Final SWCC GPA	1.45	.18	66.97	1	.00**	4.26
Constant	-4.47	.56	64.84	1	.00**	NA

Note: **p* < .05, ***p* < .01. The full model was statistically significant, χ^2 (2, N = 394) = 123.62, *p* < .001. Cox and Snell *R*² = .29 and Nagelkerke *R*² = .38. NA = not applicable

Table H- 4. Weighted binary logistic regression results predicting program dropout status

	B	S.E.	Wald statistic	df	<i>p</i>	Odds ratio
Condition	-1.11	.26	17.81	1	.00**	.33
Final SWCC GPA	-1.50	.18	68.92	1	.00**	.22
Constant	4.45	.56	63.17	1	.00**	NA

Note: **p* < .05, ***p* < .01. The full model was statistically significant, χ^2 (2, N = 394) = 124.07, *p* < .001. Cox and Snell *R*² = .29 and Nagelkerke *R*² = .39. NA = not applicable.

Table H- 5. Weighted binary logistic regression results predicting attainment of third-party credentials at SWCC

	B	S.E.	Wald statistic	df	<i>p</i>	Odds ratio
Condition	2.13	.31	46.31	1	.00**	8.39
Final SWCC GPA	1.30	.16	66.11	1	.00**	3.67
Constant	-3.48	.49	50.94	1	.00**	NA

Note: **p* < .05, ***p* < .01. The full model was statistically significant, χ^2 (2, N = 394) = 122.11, *p* < .001. Cox and Snell *R*² = .28 and Nagelkerke *R*² = .41. NA = not applicable.

Table H- 6. Weighted independent samples *t*-test results examining differences in the number of third-party credentials attained by condition

	Comparison			Treatment			Independent samples <i>t</i> -test results		
	n	Mean	SD	n	Mean	SD	<i>t</i>	df	Sig.
Number of third-party credentials attained	129	1.66	1.99	240	3.53	2.72	7.54	333.37	.00**

Note: **p* < .05, ***p* < .01.

Table H- 7. Weighted independent samples *t*-test results examining differences in final GPA of program completers by condition

	Comparison			Treatment			Independent samples <i>t</i> -test results		
	n	Mean	SD	n	Mean	SD	<i>t</i>	df	Sig.
Final GPA of program completers	54	3.15	0.48	147	3.05	0.58	1.14	199	.26

Note: **p* < .05, ***p* < .01.

Table H- 8. Weighted binary logistic regression results predicting pursuit of further education after program completion

	B	S.E.	Wald statistic	df	p	Odds ratio
Condition	.00	.43	.00	1	1.00	1.00
Final SWCC GPA	.90	.33	7.37	1	.00**	2.46
Constant	-3.67	1.17	9.79	1	.00**	NA

Note: * $p < .05$, ** $p < .01$. The full model was statistically significant, $\chi^2 (2, N = 189) = 8.19$, $p = .02$. Cox and Snell $R^2 = .05$ and Nagelkerke $R^2 = .06$. NA = not applicable.

Table H- 9. Weighted binary logistic regression results predicting employment within one month of program completion

	B	S.E.	Wald statistic	df	p	Odds ratio
Condition	0.98	.43	5.19	1	.02**	2.65
Constant	0.73	.31	5.66	1	.02**	NA

Note: * $p < .05$, ** $p < .01$. The full model was statistically significant, $\chi^2 (1, N = 144) = 5.22$, $p = .02$. Cox and Snell $R^2 = .04$ and Nagelkerke $R^2 = .06$. NA = not applicable.

Table H- 10. Weighted chi-square test results examining differences in employment outcomes by condition

Characteristics	Comparison students		Treatment students		Test statistic	p-value
	Percent	n	Percent	n		
Employment retention 3–9 months after program completion						
Yes	93.9%	31	93.1%	67	0.00	1.00
No	6.1%	2	6.9%	5		
Wage increase					0.40	.53
Yes	86.7%	13	73.3%	22		
No	13.3%	2	26.7%	8		

Appendix I. Sensitivity tests for primary impact analyses

This appendix presents findings from sensitivity tests examining the robustness of primary impact analysis findings to the use of IPTWs and the inclusion of a final GPA covariate. Overall, these findings reveal that students in the treatment condition had consistently greater odds of program completion, attainment of at least one third-party credential, and employment within one month of program completion than students in the comparison group. Additionally, the odds of students in the treatment group completing further education were not statistically different from the odds of students in the comparison group. As a result, the primary impact analysis findings were robust.

Results from sensitivity tests with no IPTW

Table I- 11. Results from sensitivity analyses predicting program completion, unadjusted by IPTWs

	B	S.E.	Wald statistic	df	p	Odds ratio
Condition	1.15	.25	21.45	1	.00**	3.16
Final SWCC GPA	1.43	.17	71.27	1	.00**	4.18
Constant	-4.35	.53	68.16	1	.00**	NA

Note: * $p < .05$, ** $p < .01$. The full model was statistically significant, $\chi^2(2, N = 394) = 128.01, p < .001$. Cox and Snell $R^2 = .28$ and Nagelkerke $R^2 = .37$. NA = not applicable

Table I- 12. Results from sensitivity analyses predicting attainment of at least one third-party credential, unadjusted by IPTWs

	B	S.E.	Wald statistic	df	p	Odds ratio
Condition	1.73	.29	35.94	1	.00**	5.61
Final SWCC GPA	1.22	.15	66.15	1	.00**	3.38
Constant	-2.98	.45	44.16	1	.00**	NA

Note: * $p < .05$, ** $p < .01$. The full model was statistically significant, $\chi^2(2, N = 394) = 111.00, p < .001$. Cox and Snell $R^2 = .25$ and Nagelkerke $R^2 = .36$. NA = not applicable

Table I- 13. Results from sensitivity analyses predicting enrollment in further education, unadjusted with IPTWs

	B	S.E.	Wald statistic	df	P	Odds ratio
Condition	.04	.40	0.01	1	.93	1.04
Final SWCC GPA	.71	.31	5.23	1	.02*	2.04
Constant	-3.14	1.09	8.38	1	.00**	NA

Note: * $p < .05$, ** $p < .01$. The full model was not statistically significant, $\chi^2(2, N = 189) = 5.57, p = .06$. Cox and Snell $R^2 = .03$ and Nagelkerke $R^2 = .04$. NA = not applicable

Table I- 14. Results from sensitivity analyses predicting employment within one month of program completion, unadjusted with IPTWs

	B	S.E.	Wald statistic	df	p	Odds ratio
Condition	.75	.41	3.43	1	.06	2.12
Constant	.83	.29	8.16	1	.00*	NA

Note: * $p < .05$, ** $p < .01$. The full model was not statistically significant, $\chi^2(1, N = 144) = 3.44, p = .06$. Cox and Snell $R^2 = .02$ and Nagelkerke $R^2 = .04$. NA = not applicable

Results from sensitivity tests with no IPTW and baseline equivalency covariates added

Table I- 15. Results from sensitivity analyses predicting program completion, unadjusted by IPTWs and including gender, veteran status, and age as additional covariates

	B	S.E.	Wald statistic	df	p	Odds ratio
Condition	1.37	.28	23.60	1	.00**	3.95
Final SWCC GPA	1.45	.17	71.56	1	.00**	4.27
Gender	.47	.44	1.16	1	.28	1.60
Veteran Status	.15	.34	0.19	1	.67	1.16
Age	-.02	.01	2.57	1	.11	0.98
Constant	-4.43	.74	35.54	1	.00**	NA

Note: * $p < .05$, ** $p < .01$. The full model was statistically significant, $\chi^2(5, N = 394) = 132.13, p < .001$. Cox and Snell $R^2 = .29$ and Nagelkerke $R^2 = .38$. NA = not applicable

Table I- 16. Results from sensitivity analyses predicting attainment of at least one third-party credential, unadjusted by IPTWs and including gender, veteran status, and age as additional covariates

	B	S.E.	Wald statistic	df	p	Odds ratio
Condition	2.12	.34	39.89	1	.00**	8.37
Final SWCC GPA	1.25	.15	66.94	1	.00**	3.50
Gender	.12	.53	.05	1	.82	1.13
Veteran Status	.56	.37	2.23	1	.14	1.75
Age	-.03	.01	5.74	1	.02*	.97
Constant	-2.53	.78	10.63	1	.00**	NA

Note: * $p < .05$, ** $p < .01$. The full model was statistically significant, $\chi^2(5, N = 394) = 119.22, p < .001$. Cox and Snell $R^2 = .26$ and Nagelkerke $R^2 = .38$. NA = not applicable

Table I- 17. Results from sensitivity analyses predicting enrollment in further education, unadjusted by IPTWs and including gender, veteran status, and age as additional covariates

	B	S.E.	Wald statistic	df	p	Odds ratio
Condition	-.06	.47	.02	1	.89	.94
Final SWCC GPA	.79	.32	5.99	1	.01*	2.20
Gender	-.86	.53	2.67	1	.10	.42
Veteran Status	-.16	.53	.09	1	.76	.85
Age	-.01	.02	.25	1	.62	.99
Constant	-2.30	1.19	3.71	1	.05	NA

Note: * $p < .05$, ** $p < .01$. The full model was not statistically significant, $\chi^2(5, N = 189) = 8.55, p < .001$. Cox and Snell $R^2 = .04$ and Nagelkerke $R^2 = .06$. NA = not applicable

Table I- 18. Results from sensitivity analyses predicting employment within one month of program completion, unadjusted by IPTWs and including gender, veteran status, and age as covariates

	B	S.E.	Wald statistic	df	p	Odds ratio
Condition	1.12	.50	4.91	1	.03*	3.05
Gender	.94	.69	1.88	1	.17	2.56
Veteran Status	-.25	.56	.20	1	.66	.78
Age	-.06	.02	6.79	1	.01**	.94
Constant	1.58	.96	2.69	1	.10	NA

Note: * $p < .05$, ** $p < .01$. The full model was statistically significant, $\chi^2(4, N = 144) = 11.65, p = .02$. Cox and Snell $R^2 = .08$ and Nagelkerke $R^2 = .12$. NA = not applicable

Results from sensitivity tests without the GPA covariate

Table I- 19. Weighted binary logistic regression results for the sensitivity analyses predicting program completion, without final GPA covariate

	B	S.E.	Wald statistic	df	p	Odds ratio
Condition	.80	.22	12.95	1	.00**	2.228
Constant	-.33	.18	3.43	1	.06	NA

Note: * $p < .05$, ** $p < .01$. The full model was statistically significant, $\chi^2(1, N = 396) = 13.18$, $p < .001$. Cox and Snell $R^2 = .04$ and Nagelkerke $R^2 = .05$. NA = not applicable

Table I- 20. Weighted binary logistic regression results for the sensitivity analyses predicting attainment of at least one third-party credential, without final GPA covariate

	B	S.E.	Wald statistic	df	p	Odds ratio
Condition	1.32	.24	29.75	1	.00**	3.74
Constant	.14	.18	.61	1	.44	NA

Note: * $p < .05$, ** $p < .01$. The full model was statistically significant, $\chi^2(1, N = 396) = 30.54$, $p < .001$. Cox and Snell $R^2 = .08$ and Nagelkerke $R^2 = .11$. NA = not applicable

Table I- 21. Weighted binary logistic regression results for the sensitivity analyses predicting enrollment in further education, without final GPA covariate

	B	S.E.	Wald statistic	df	p	Odds ratio
Condition	-.18	.42	.20	1	.66	.83
Constant	-.68	.37	3.36	1	.07	NA

Note: * $p < .05$, ** $p < .01$. The full model was statistically significant, $\chi^2(1, N = 189) = 0.20$, $p = .66$. Cox and Snell $R^2 = .001$ and Nagelkerke $R^2 = .002$. NA = not applicable