ACTION RESEARCH BRIEF

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WTCS Career Pathways: A Mechanism to Advancing Workforce and Economic Equity

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Abstract

Career pathways provide a series of connected education and training opportunities that enable individuals to secure industry relevant credentials and obtain employment within an occupational area. Since 2014, the Wisconsin Technical College System has developed more than 400 embedded credentials that are part of a larger career pathway. Each of these credentials are developed through comprehensive labor market analysis and employer engagement to ensure relevancy to industry needs. The purpose of this study is to better understand if advancement along a career pathway contributes to higher rates of employment and increased earnings. To investigate this concept, a four-year longitudinal analysis was conducted to examine employed, employed related, and employed related yearly salary outcomes among WTCS students who successfully completed multiple credentials within a career pathway. Results demonstrate that as students advance along a career pathway, both employed and employed related rates of individuals in the labor force increase and so does employed related yearly salary. Results also suggest the career pathway model as an equity lever that advances employment outcomes across diverse student populations and various career clusters.

Introduction

Career pathway embedded credentials are a postsecondary education service delivery model that purposefully packages components of curriculum from a longer degree program into short-term credentials (Austin, Mellow, Rosin, & Seltzer, 2012). Each of these short-term credentials align with labor market demands and are also part of the required coursework in the longer degree program. The intention of the model is to allow students to seamlessly build their skills and advance their economic mobility while completing each component of the career pathway. One two-year college example of this career pathway model includes the progression from a less-than one-year Certified Nursing Assistant program, to a one-year credential in Licensed Practical Nursing, followed by an Associate Degree in Nursing. After completing any credential within the career pathway, a student can exit the postsecondary system, enter the workforce for a job aligned with the completed credential, and can return to earn the next credential potentially leading to career advancement and higher wages.

There are many benefits to the embedded credential career pathway model that include increasing access to short-term credentials with labor market value, providing the economy with skilled labor in a quick turnaround fashion, and advancing the economic prosperity of the population without a credential by providing a pathway to career advancement and lifelong learning. Recent research has also suggested that students who first enroll in an embedded credential have an increased likelihood of completing a longer degree program within the

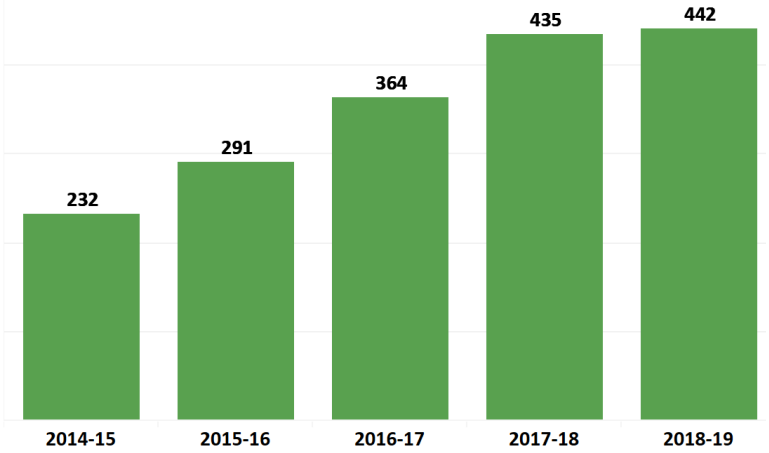
pathway potentially leading to increased earnings (e.g., Giani & Fox, 2017; Kiddoo, 2017). Purposeful career pathways may also be a mechanism to accelerate the advancement of employment outcomes among minoritized populations. The Center for Law and Social Policy (CLASP) has advocated for the career pathway model as a solution to improve economic equity through the retooling of workforce and education systems that better serve individuals from diverse communities (Pham, 2018). With copious benefits, the career pathway model has been reflected in the actions of the federal government and integrated into three federal laws that include the Carl D. Perkins Act (Perkins V), the Workforce Innovation and Opportunity Act (WIOA), and the Higher Education Act (HEA) (Cielinski, 2019).

The Wisconsin Technical College System (WTCS) has embraced career pathways. Each of the 16 WTCS colleges have implemented multiple entry and exit points within postsecondary pathways resulting in the creation of hundreds of embedded credentials (i.e., WTCS Embedded Technical Diplomas and WTCS Career Pathway Certificates). WTCS embedded credential career pathways are designed to allow students to progress along the pathway and earn short-term credentials that are part of a larger career pathway. Progression along the pathway is supported by coordinated and aligned curriculum between embedded credentials and a longer-term degree program to assure that all completed courses in an embedded credential are recognized as progress to completion of the longer-degree program.

Wisconsin employers play a vital role in the development of WTCS career pathways. Before formal approval from the WTCS Office, each credential within a career pathway is fully vetted through a labor market needs assessment and concept investigation. The career pathway development process includes the collection, analysis, and synthesis of college district employer feedback via focus groups or surveys and rigorous labor market analysis of occupational projections through secondary labor market data. WTCS colleges also collaborate with district employers to design the curriculum within each career pathway. This important alignment step ensures that the curriculum is designed to provide students experience with occupation specific technology and build knowledge, skills, and abilities that are vital for employability upon graduation. Once a career pathway is fully implemented at a WTCS college, employers engage in the program modification process via program advisory committees and program reviews to verify pathway relevancy in relation to the pace of change in the workplace and industry. Collectively, these activities ensure that WTCS career pathways are responsive to local workforce needs.

During the 2014-15 year, over 200 approved embedded credentials[1] were offered within the WTCS. This number nearly doubled by the 2018-19 year with over 400 WTCS approved embedded credentials offered; see Figure 1. The growth in embedded credential offerings is attributed to both a system-wide strategy for scaling career pathways and WTCS college efforts to implement local pathways. To build a system-wide understanding of purposeful embedded credential career

Figure 1. Number of WTCS Career Pathway Embedded Credentials with Student Enrollments[1]



[1] The number of WTCS career pathway embedded credentials with enrollments are limited to WTCS Embedded Technical Diplomas and WTCS Career Pathway Certificates. If multiple WTCS colleges offer the same embedded credential, then the embedded credential will be counted for each college offering the program.

pathways, the WTCS Office coordinated a day long Career Pathways Bootcamp in 2014 and communicated the WTCS Office program approval process for embedded credential career pathways. Financial incentive was established through the WTCS Outcomes Based Funding appropriation. General state aid is awarded for each colleges' proportionate share of credentials awarded in high demand fields, which includes embedded credentials within a WTCS career pathway.

These short-term credential offerings materialize positive outcomes for students. Historically, over one-half of all new students enrolled in a WTCS embedded credential complete the credential within the year, allowing completers to quickly build their skills and enter the labor market or continue on to the next credential within the pathway. The scaling of career pathways has led to nearly 9,000 WTCS embedded credentials being awarded in the 2018-19 year alone.

To illustrate career pathway progression, Figure 2 presents an analysis of short-term, one-year outcomes for individuals who completed a WTCS Embedded Technical Diploma in the 2014-15 year and their future reenrollment patterns within the WTCS through the 2018-19 year. During the 2014-15 year, 6,005 students completed a WTCS Embedded Technical Diploma[2]. Nearly one-half of all students who completed a WTCS Embedded Technical Diploma during the 2014-15 year reenrolled in the WTCS in the following years. Of the population that reenrolled in the WTCS, roughly 90 percent enrolled in the next WTCS credential within the career pathway.

Patterns to reenrollment within the WTCS varied. Of the 2014-15 completers of a WTCS Embedded Technical Diploma, roughly 38 percent continued their education within one year of completing the first credential in the pathway. The vast majority (94 percent) advanced within their career pathway by enrolling in the next WTCS pathway credential while six percent enrolled in a WTCS credential outside of their initial career pathway.

Completers also continued their education outside of the WTCS within one year of completion. One in five students who completed an Embedded Technical Diploma during the 2014-15 year had an enrollment record tied to an institution outside the WTCS within the National Student Clearinghouse System. The top three institutions outside of the WTCS with enrollment records include the University of Wisconsin-Madison, the University of Wisconsin-Milwaukee, and the University of Wisconsin-Oshkosh. Roughly 21 percent of the population continuing their education outside of the WTCS eventually reenrolled within the WTCS; 82 percent of which enrolled in the next credential within their original career pathway.

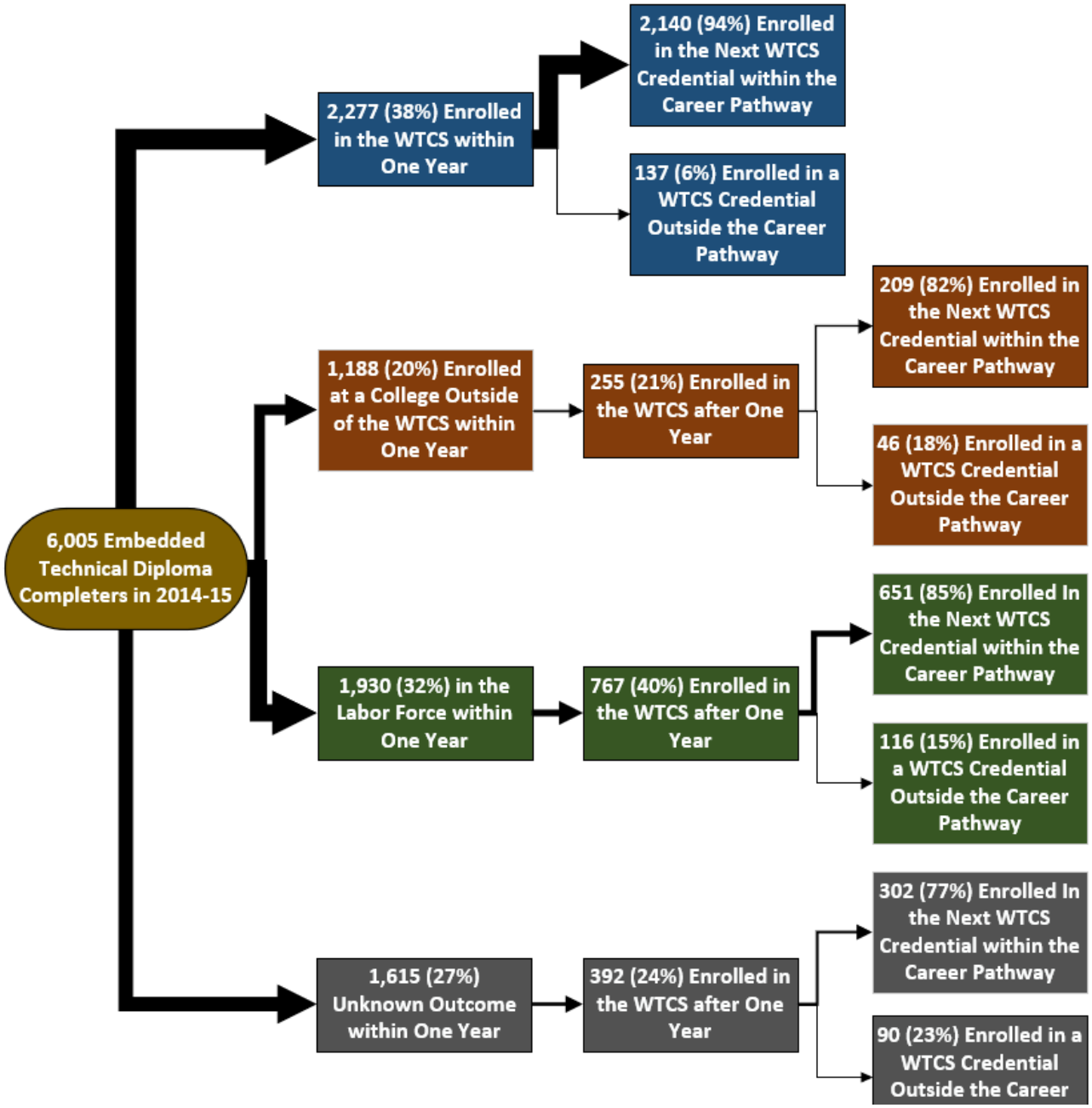
Nearly one-third of the 2014-15 Embedded Technical Diploma completers chose to participate in the labor force as reported in the WTCS Graduate Outcomes Survey. Of this population, more than 90 percent reported they were employed. Roughly three out of four employed individuals indicated they found employment within the college district where they completed their WTCS Embedded Technical Diploma. Of those in the labor force, 40 percent eventually reenrolled in the WTCS with 85 percent continuing their education in their original career pathway.

[2] Career pathway progression analysis, including short-term and long-term outcomes, assesses WTCS Embedded Technical Diploma completers and not WTCS Career Pathway Certificate completers due to employment data not being collected for WTCS Career Pathway Certificate completers via the WTCS Graduate Outcomes Survey. To provide perspective, less than five percent of all WTCS embedded credential completers attained a WTCS Career Pathway Certificate while roughly 95 percent attained a WTCS Embedded Technical Diploma.

The short-term outcomes of 27 percent of the entire sample are unknown with no matched student records in the WTCS Client Reporting System, the WTCS Graduate Outcomes System, or the National Student Clearinghouse System one year after completion of a WTCS Embedded Technical Diploma in 2014-15. Nonetheless, 24 percent of this population eventually reenrolled in the WTCS; of which, 77 percent continued along their WTCS career pathway.

Figure 2. One-Year Outcomes of 2014-15 Embedded Technical Diploma Completers and Reenrollment within the WTCS

Figures include duplication if an Embedded Technical Diploma completer achieved multiple one-year outcomes (e.g., enrolled in the WTCS within one year and participated in the labor force within one year). Width of each arrow is representative of the number of students compared to the number of Embedded Technical Diploma completers in 2014-15. A wider arrow signifies a higher number of students who advance to the next step in the diagram.



Additional analysis demonstrates that roughly one in six of the 2014-15 completers of a WTCS Embedded Technical Diploma engaged in more than one of these outcomes i.e. enrolled in the WTCS, enrolled outside the WTCS, or participated in the labor force within one year of completion. Roughly eight percent of the sample enrolled in the WTCS and also reported participation in the labor force while six percent of the sample enrolled outside of the WTCS and also reported participation in the labor force. Only two percent of the 2014-15 WTCS Embedded Technical Diploma completers were dually enrolled within the WTCS and outside the WTCS. Less than one percent of the overall sample engaged in all three of the presented one-year outcomes i.e. enrolled in the WTCS, enrolled outside the WTCS, and participated in the labor force.

While these findings highlight promise in the WTCS providing flexible and quick-to-complete embedded credentials that lead to employment and contribute to local employment needs, there is continued interest in understanding longer-term career pathway outcomes. Specifically, how employment outcomes change as embedded credential completers enter the workforce, re-enter the WTCS to complete the next credential within the career pathway, and advance their career. The purpose of this study is to explore the employment outcomes of students who participate in career pathway embedded credentials by addressing the following question.

Research Question: Do career pathways, through an embedded credential model, lead to increased employment outcomes after completion of each credential in the pathway as measured by employment rates and earnings?

Data Sample

To understand the employment outcomes of students participating in WTCS career pathway embedded credentials, employment data was drawn from the WTCS Graduate Outcomes System for statistical analysis. The WTCS Graduate Outcomes System compiles employment data for graduates from each of the 16 WTCS colleges who respond to the annual WTCS Graduate Outcomes Survey after graduation. Historically, the system-wide survey response rate has hovered between 60 and 70 percent.

WTCS Client Reporting System data was appended to the WTCS Graduate Outcomes System data to support additional analysis of employment outcomes by student characteristics and career pathway career cluster. Client Reporting System data is supplied to the WTCS Office on an annual basis across all 16 WTCS colleges. To control for changes in student characteristics as they progress along a career pathway, appended Client Reporting System data is based on data reported during the 2014-15 year i.e. when the student completed the first credential in the career pathway.

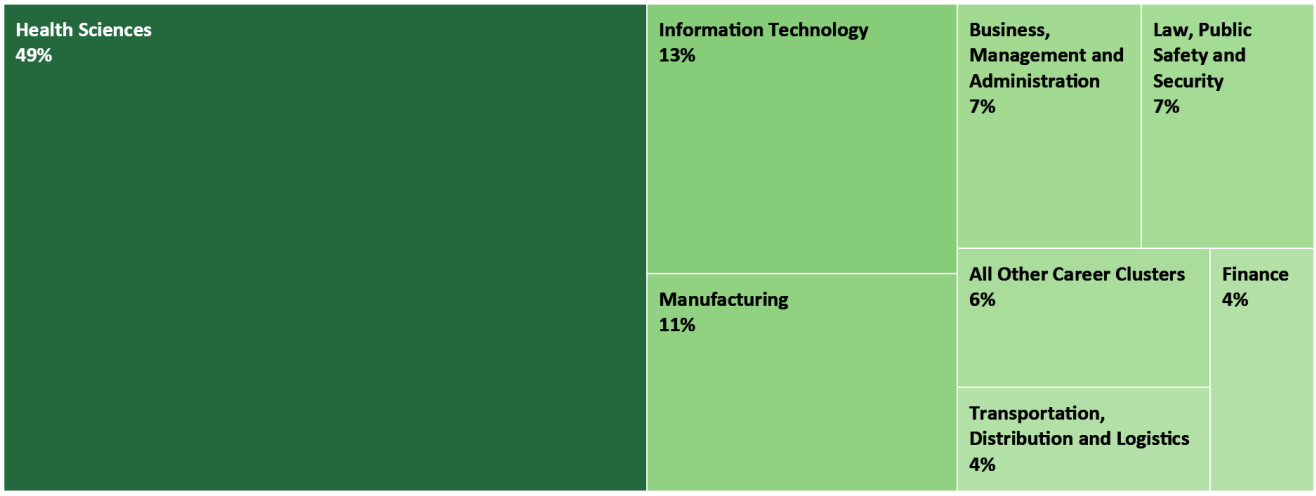
The initial sample included the employment outcomes reported in the 2014-15, 2015-16, 2016-17, and 2017-18 years among the 2014-15 Embedded Technical Diploma completers. Each 2014-15 Embedded Technical Diploma completer was tracked to see if they: found employment after completion of a WTCS Embedded Technical Diploma in 2014-15; enrolled in the next WTCS credential in the career pathway; completed the next WTCS credential in the career pathway; and found employment after completion of the second credential in the career pathway. The final sample was cleansed to only include 2014-15 Embedded Technical Diploma completers who responded to the WTCS Graduate Outcomes Survey after their 2014-15 completion and responded to the WTCS Graduate Outcomes Survey after completing the next credential in the career pathway. Data cleansing led to a final data set consisting of 954 unique WTCS student records.

Of the final sample, 47 percent of students identified as economically disadvantaged during the 2014-15 year i.e. the student's household income was at or below the poverty level set by the Department of Health and Human Services or the student was receiving need-based financial assistance. Just over 51 percent of the

sample identified as 25 or older at the beginning of the 2014-15 year, and 59 percent identified as female. Nearly 88 percent of the sample identified as White, three percent identified as Asian, three percent identified as Hispanic or Latinx, two percent identified as Black or African American, two percent identified as two or more races, one percent identified as American Indian or Alaskan Native, and two percent did not identify their race/ethnicity.

A total of 15 career clusters were represented within the final sample. As presented in Figure 3, more than 86 percent of the sample consisted of students participating in five of the 15 career clusters including: Health Sciences (49 percent); Information Technology (13 percent); Manufacturing (11 percent); Business, Management and Administration (7 percent); and Law, Public Safety and Security (7 percent). These five career clusters also had the highest count of embedded credential offerings within the WTCS during the 2014-15 year. One potential explanation for the high proportion of Health Sciences career cluster students within the sample likely relates to a $19.9 million, four-year U.S. Department of Labor Trade Adjustment Assistance for Community College and Career Training (TAACCCT) grant awarded to the WTCS in 2014. The statewide project, with participation from all 16 WTCS colleges, included $15 million to expand training and support services for high-growth careers in the healthcare industry and $4.9 million to advance the state career pathway system.

Figure 3. Sample Distribution by WTCS Career Pathway Career Cluster

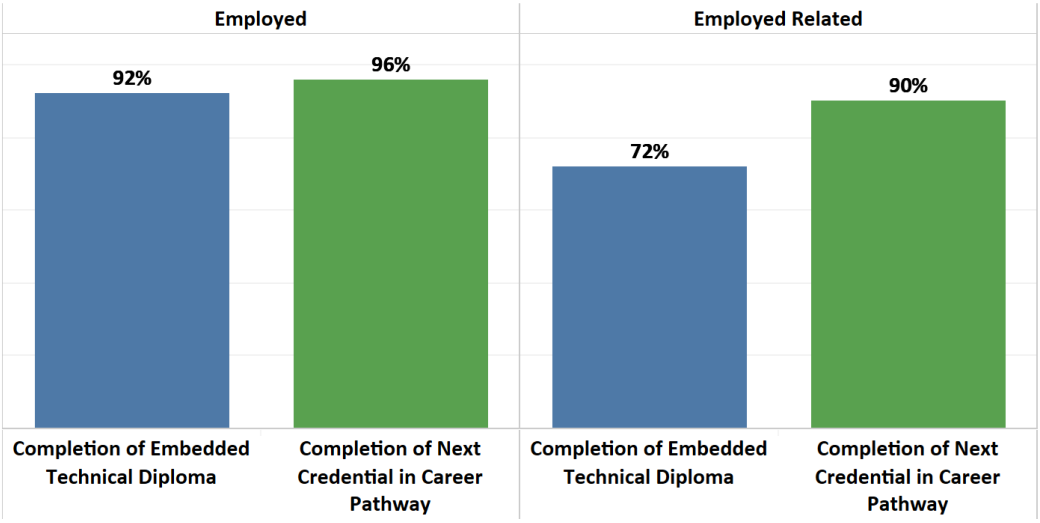


Statistical Methods & Results

To address this study's research question, various statistical methods were used including McNemar tests, repeated measure t-tests, and ANOVA. A description of the statistical methods used in this study can be found in the Appendices.

Results demonstrate that employed (i.e., individuals in the labor market who indicate they are employed) and employed related (i.e., individuals employed who indicate their employment is related to their WTCS education) outcomes increase as students advance along a career pathway; see Figure 4. As reported in the WTCS Graduate Outcomes Survey, 92 percent of respondents within the labor force who completed a WTCS Embedded Technical Diploma in 2014-15 reported they were employed. When tracked longitudinally, completers of a 2014-15 WTCS Embedded Technical Diploma who re-enrolled within the WTCS and completed the next credential in the career pathway reported an employment rate of 96 percent, demonstrating a four-percentage point increase from the completion of the initial WTCS Embedded Technical Diploma to the next credential within the career pathway.

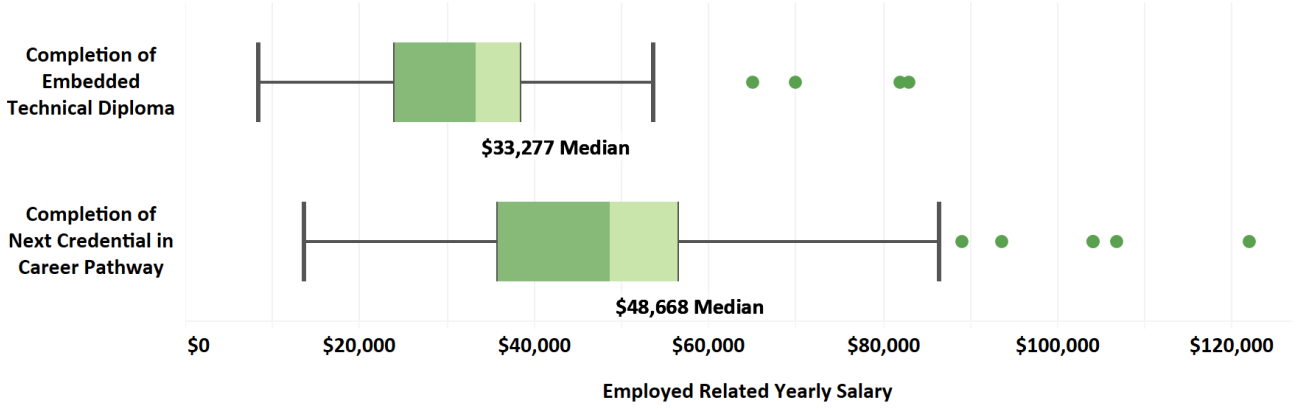
Figure 4. WTCS Embedded Technical Diploma Career Pathway Employment Outcomes



Results of employed related outcomes demonstrate a comparatively more pronounced increase as students progress along their career pathway. Roughly 72 percent of the employed completers of a WTCS Embedded Technical Diploma in 2014-15 indicated their position was related to the training they received through the WTCS. When tracked longitudinally, the percent employed related increased to 90 percent after completion of the next credential in the career pathway, representing an 18-percentage point increase from the completion of the initial WTCS Embedded Technical Diploma to the next credential within the career pathway.

Results reveal that employed related yearly salaries[3] increase as students advance along their career pathway; see Figure 5. Completers of a WTCS Embedded Technical Diploma in 2014-15 reported an employed related median yearly salary of $33,277. When tracked longitudinally, the reported employed related median salary increased to $48,668 after completion of the next credential in the career pathway. The difference between the two figures is an increase of $15,391 and represents a growth rate of 46 percent in median earnings.

Figure 5. WTCS Embedded Technical Diploma Career Pathway Employed Related Salary Distribution
The box and whisker plot presents the range of employed related salaries, the median employed related salaries, salary quartile groupings noted by the outside whiskers and varied green boxes, and outlier employed related salaries noted by green dots.



[3] Employed related yearly salary data are specific to graduates who indicated their employment is related to the training they received through the WTCS and who reported working 35 hours or more per week.

Analysis of earnings also reveal that the range of earnings and distribution of earnings significantly increase from completion of the first credential in the pathway to completion of the next credential in the pathway.

Analysis by Student Characteristics and Career Pathway Career Cluster

Additional analysis was conducted to better understand employment outcomes among the various groups participating in career pathways. The same employment measures (i.e., employed, employed related, and employed related yearly salary) were assessed across student characteristics to include economically disadvantaged status, gender, age, and race/ethnicity. A total of five career clusters were also analyzed based on their high representation within the sample. These career clusters include: Health Sciences; Information Technology; Manufacturing; Business, Management and Administration; and Law, Public Safety and Security. The top five Embedded Technical Diplomas with the most completions are presented in Table 1.

Table 1. WTCS Embedded Technical Diplomas with the Highest Count of Completions by Career Cluster in 2014-15

Health Sciences	Information Technology
•Nursing Assistant •Practical Nursing •Medical Coding Specialist •Patient Service Specialist •Pharmacy Technician	•IT - Network Technician •IT User Support Technician •IT-Computer Support Technician •IT - Health Care Services for the IT Professional •IT - Help Desk Support Specialist
Manufacturing	**Business, Management and Administration**
•Gas Metal Arc Welding (GMAW) •Shielded Metal Arc Welding (SMAW) •Flux Core Arc Welding •Welding/Maintenance & Fabrication •Machine Tool Operation	•Accelerated - Supervision •Accelerated - Leadership •Accelerated - Lean Organizations •Office Assistant •Accelerated - Human Resource Management
Law, Public Safety and Security	
•Emergency Medical Technician •Emergency Medical Technician - Paramedic •Paralegal Post-Baccalaureate •Paramedic Technician •Law Enforcement	

Results suggest that the WTCS embedded credential career pathway model may be a mechanism to close workforce equity gaps among economically disadvantaged populations. Specifically, the employed related rate for economically disadvantaged students increased from 71 percent after completion of the first WTCS Embedded Technical Diploma to 92 percent after completion of the next credential in the career pathway while the employed related rate increased from 73 percent to 89 percent among students who were not economically disadvantaged. Similar workforce equity building results exist in employed related earnings. ANOVA results reveal substantial growth in earnings as students progress along a career pathway, and significant interaction effects between pathway progression and economically disadvantaged status. As illustrated in Figure 6, earnings for economically disadvantaged students are less than students without an economic disadvantage after completion of the first Embedded Technical Diploma in the pathway. When tracked longitudinally, the earnings for economically disadvantaged students is higher than students without an economic disadvantage. These findings echo existing narratives suggesting the career pathway model as a lever to advancing economic mobility among low-income populations (Pham, 2018). This finding is especially significant within the WTCS as 47 percent of students within the sample identified as economically disadvantaged before completion of the first credential in the pathway.

Figure 6. WTCS Embedded Technical Diploma Career Pathway Employed Related Mean Salary by Economically Disadvantaged Status

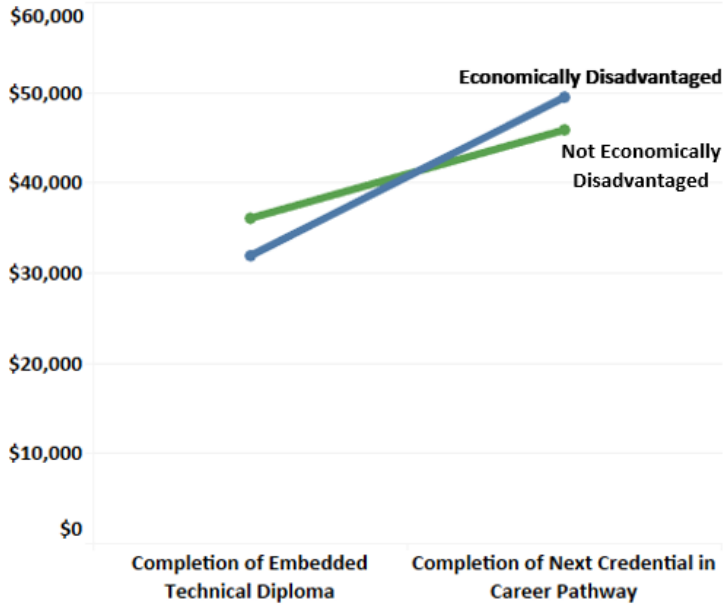
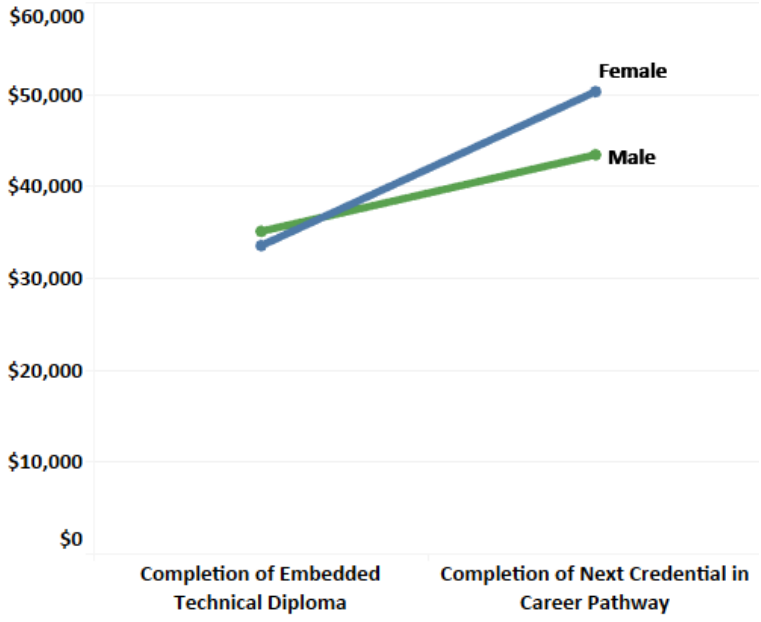


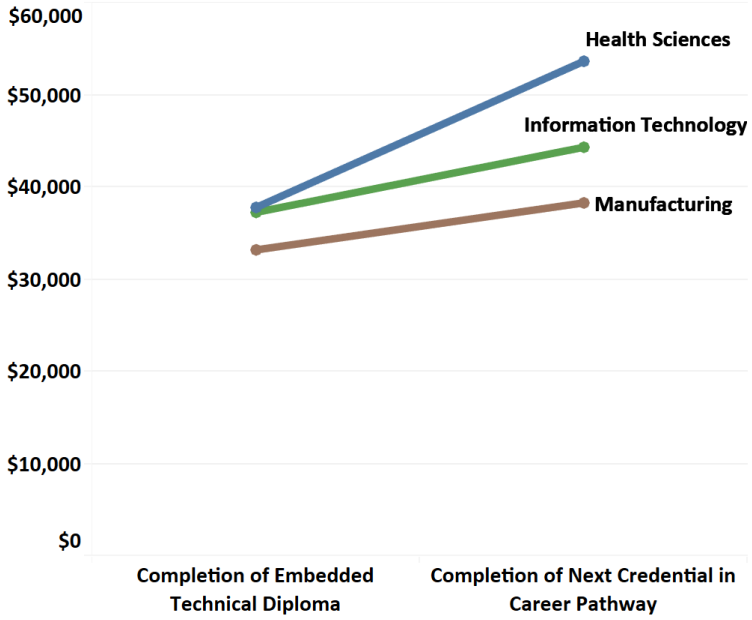
Figure 7. WTCS Embedded Technical Diploma Career Pathway Employed Related Mean Salary by Gender



Employment outcomes by gender increased as students progressed along a career pathway, but to varying degrees. Both females and males had the same employed related rate of 72 percent after the completion of the first credential within the pathway. After completion of the next credential in the pathway, the employed related rate increased to 94 percent among females and 85 percent among males. Similar findings exist in employed related earnings. As demonstrated in Figure 7, earnings growth for females significantly outpaced earnings growth for males. One potential explanation for these results may reside in the career cluster of the career pathway.

Analysis of enrollment by career pathway career cluster reveals that roughly 85 percent of the sample in the Health Sciences cluster identify as female. This is noteworthy because the Health Sciences career cluster has comparatively higher rates of employment and earnings as students advance along their career pathway.

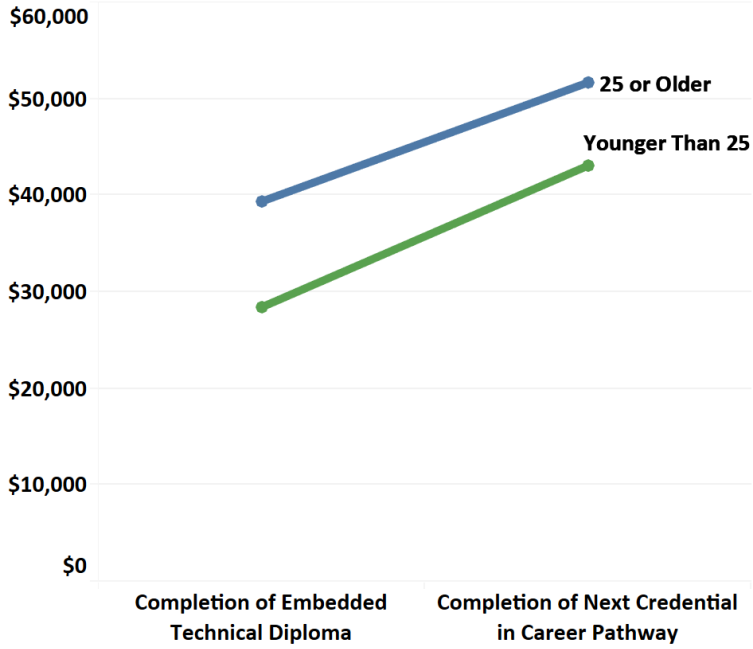
Figure 8. WTCS Embedded Technical Diploma Career Pathway Employed Related Mean Salary by Career Cluster



As demonstrated in Figure 8, employed related earnings by career cluster varied after the completion of the first credential in the career pathway and after completion of the second credential in the pathway. Potential explanations for differences in earnings by career cluster may relate to occupation specific workforce shortages, occupational demands for unique skills or technical expertise, or rigorous requirements for entry into the profession such as passing a licensure exam after obtaining a postsecondary credential.

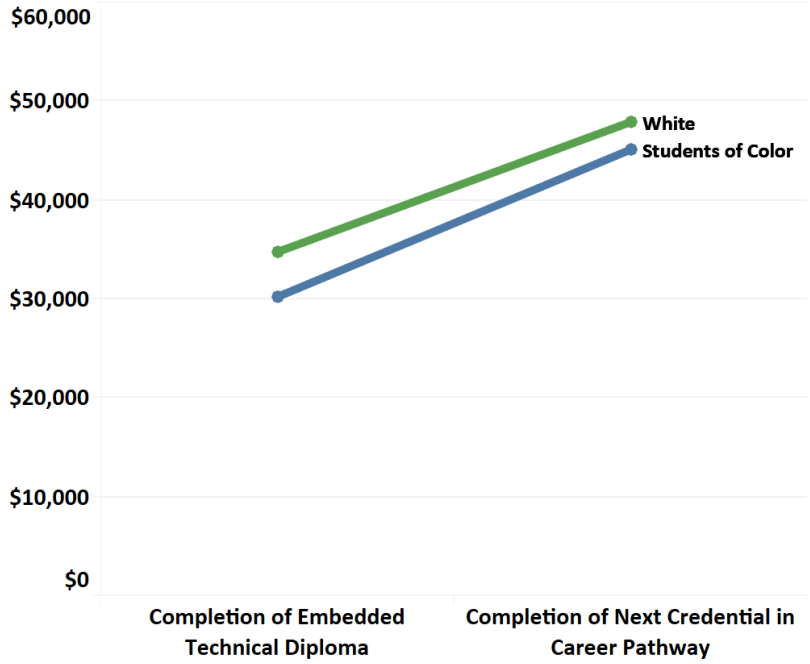
Categorized as individuals younger than 25 and individuals 25 or older, both age groups experienced increases across the three employment outcomes within this study, but employed related outcomes were more favorable for older populations. The employed related rate for individuals younger than 25 increased from 74 percent to 88 percent (a difference of 14 percentage points) and increased from 70 percent to 92 percent (a difference of 22 percentage points) for individuals 25 or older. Employed related earnings were also significantly different between the two age groups. As illustrated in Figure 9, individuals younger than 25 had lower earnings compared to individuals 25 or older after the completion of each credential within their career pathway. Potential explanations for older populations reporting comparatively higher earnings may relate to previous or prolonged work experience in a related field or obtainment of prior education or training. The rate of change in earnings growth between the two age groups was not significantly different, suggesting the career pathway model advances earnings equally among both age groups.

Figure 9. WTCS Embedded Technical Diploma Career Pathway Employed Related Mean Salary by Age Group



Employment outcomes were also analyzed by race/ethnicity. Because of small sample sizes, all race/ethnicity groups other than White were consolidated into one group. Nonetheless, employed related and employed related yearly salary significantly increased as students of color and White students advanced along a career pathway. While these employment figures increased within each group, it is important to note that earnings at each point along the career pathway were comparatively lower for students of color, however, the differences were not statistically significant within this study; see Figure 10. These findings suggest that the career pathway model has positive and relatively equal effects for both White students and students of color. Nonetheless, recent research within the WTCS related to program participation has suggested that minoritized communities are underrepresented in WTCS programs that lead to higher wages (Barker, 2020). Additionally, previous research has identified a series of barriers that may contribute to disparities in program participation that include geographic access such as physical location of learning, program-specific financial costs such as textbooks or course materials, program entrance requirements, immediate employment needs of incoming students and limited awareness of high demand and high wage program options (Advance CTE, 2019).

Figure 10. WTCS Embedded Technical Diploma Career Pathway Employed Related Mean Salary by Race/Ethnicity



Discussion & Implications

With more than 400 active embedded credentials, the WTCS is committed to offering career pathways that are intentionally designed to meet labor market needs. This study explored if the scaling of an embedded credential model supports increased employment outcomes after completion of each embedded credential within the career pathway. Results suggest that WTCS Embedded Technical Diploma completers that engage in the labor force and continue their education within their respective WTCS career pathway both increase their likelihood of obtaining employment and earnings potential. Further, results from this study reveal that the career pathway embedded credential model does not produce inequities in earnings growth across diverse student populations and is a mechanism to advancing workforce and economic equity while providing employers with skilled labor.

A potential explanation for the suggested success of the WTCS embedded credential career pathway model may relate to the efficiency and flexibility in obtaining multiple credentials in a pathway. Nationally, Cohen and colleagues (2014) indicate that two-year colleges enroll the highest proportion of working adults across all postsecondary education sectors. Two-year college students often have family obligations and are actively working which can stifle the likelihood of credential completion. Due to these competing demands, working adults generally require flexible educational opportunities (Chung, Cocina, & Dresser, 2012). The WTCS embedded credential model provides such opportunities. Each year, over one-half of all new students enrolled in a WTCS embedded credential completed the credential within the year; allowing them to quickly build their

skills and enter the labor market or continue to the next credential within the career pathway. Research generally suggests that individuals possessing an academic degree earn a greater income than individuals without a degree, and earnings increase with each subsequent degree earned (Jaeger & Page, 1996; Matheny, 2013; Schneider, 2015). By providing quick to complete credentials within a career pathway, WTCS students can obtain multiple credentials in a short time, potentially leading to higher rates of employment and earnings as suggested by this study's primary findings.

It is important to note that simply embedding a short-term credential within a larger credential does not necessarily result in increased employment and earnings potential along a career pathway. Baker (2011) stresses the importance of assuring embedded credentials within a pathway are intentional and directly related to labor market needs. Side-stepping this important aspect of the career pathway model could result in credential inflation where students earn a credential without labor market value (Baker, 2011). Coupled with the efficiency and flexibility in obtaining multiple credentials within a WTCS career pathway, another explanation to this study's findings may reside in the pivotal role Wisconsin employers play in the development of WTCS career pathways.

WTCS colleges actively engage employers in the career pathway design process. WTCS colleges coordinate their program design efforts with local employers via needs assessments that include employer surveys and employer focus sessions. Additionally, WTCS colleges conduct rigorous labor market analysis of occupational projections through secondary labor market data and investigate surrounding postsecondary education offerings to negate labor market saturation within a given occupation. WTCS colleges also engage employers in the formal design of each WTCS program's curriculum that includes an understanding of which occupation specific technologies, knowledge, skills, and abilities are vital for employability upon graduation. Further, employers are involved in the WTCS program modification process via program advisory committees to verify WTCS program relevancy in relation to the pace of change in the workplace and industry. Through employer engagement in the pathway design, curriculum development, and program modification processes, Wisconsin employers know each WTCS graduates' immediate market value and the value that WTCS colleges provide to their workforce.

Collectively, the results from this study reveal that the implementation of WTCS embedded credential career pathways provide significant economic benefits for students. Below are a series of promising practices for WTCS career pathway implementation that can be thought of as actions for continued success. Additionally, policymakers may consider these as they influence an environment for career pathways expansion.

- ✓ **Center Employment Outcomes to College Student Success**

As colleges continue to expand their career pathway efforts, labor market outcomes should remain a central component to student success and communicated as such both internally and with external partners. Simply put, career pathway offerings should be communicated as a mechanism to advance economic mobility for diverse populations within the college district and provide a talent pipeline to district employers. By centering employment outcomes to student success, college stakeholders understand the college's commitment to advancing the economy and the value that education provides to students and employers. Further, this action provides a common north star that drives institutional policy and practice to develop industry relevant college credentials.

- ✓ **Employer Engagement in Career Pathway Development is Key**

One of the key stakeholders actively engaged in the WTCS career pathway development process is employers. Regional employers should continue to be engaged in the career pathway design, curriculum development,

and program modification process to ensure career pathway offerings align to the needs of employers within the college's district. Through this collaborative relationship, employers can define the skills needed for employment and colleges can coordinate program offerings to meet the defined need. This vital step in the career pathway development process limits the effects of credential inflation by ensuring that each developed credential has labor market value. Further, this activity aligns with the message of centering employment outcomes to college student success and demonstrates the college's commitment to enhancing the local economy.

- ✓ **Scale Efficient and Flexible Career Pathways to Advance Economic Equity**

As colleges engage employers in the career pathway development process, attention should also be given to the populations served within the college district. Given that two-year colleges serve the highest proportion of working adults across all postsecondary education sectors who may also have family obligations and be economically disadvantaged (Cohen, Brawer, & Kisker, 2014), colleges should ensure that career pathways are both efficient and flexible. By scaling efficient and flexible career pathways, each student can enroll in credentials to quickly build their skills and enter the labor market to build economic self-sufficiency. Further, students can reenter their postsecondary career pathway to build upon their prior successes and advance within their career.

- ✓ **Build Awareness of Career Pathways and Target Efforts in Minoritized Communities**

Given the benefits of purposeful career pathways, colleges should not only prioritize efforts to further develop career pathways but also to build awareness of existing career pathway offerings. One strategy to effectively communicate career pathway offerings is through the development and distribution of visual career pathway maps. Within these career pathway visuals, programs are clearly mapped to include each embedded credential that is a part of the longer-term credential (e.g., less-than one-year Certified Nursing Assistant program, to a one-year credential in Licensed Practical Nursing, followed by an Associate Degree in Nursing). Career pathway maps may also include occupation names that each credential in the pathway aligns with, graduate earnings potential, credit for prior learning opportunities, high school dual credit offerings that align with the postsecondary pathway, and articulation agreements. Once developed, career pathway maps can be shared across multiple distribution channels to include the college website and with external partners such as area high schools and industry trade groups. Given this study's finding that career pathways advance workforce equity across diverse student populations, colleges should also consider targeted efforts to build career pathway awareness among minoritized communities.

- ✓ **Continuously Evaluate Career Pathway Program Quality**

Career pathway quality should be monitored through ongoing program review. Given career pathways are centered on employment outcomes, colleges should routinely investigate current offerings to ensure that career pathway credentials maintain industry relevancy. Employers should be involved in the career pathway program review process and be provided transparency in outcomes including challenges and successes to implementation and maintenance. College staff and employers should collaborate to improve career pathways, evaluate equity in student participation and completion of college career pathways, and validate that career pathway credentials provide students with the necessary training to enter employment in an aligned occupation. As colleges implement action plans derived from annual career pathway review, measurements should be established to evaluate if the implemented actions lead to the desired outcome. These results should be shared with involved parties to close the assessment loop. Colleges should also establish career pathway credential advisory committees with employer representation to extend the conversation beyond program review. Advisory committees can provide valuable insights and strategies to

improve the student experience by building connections to active learning opportunities like internships or partnering in employability activities like career fairs or mock interviews. By continuously evaluating career pathway program quality, colleges can build lasting relationships with area employers, engage in meaningful reflection and action planning to advance career pathway success, and focus efforts to ensuring equity in student participation and completion of college career pathways.

✓ **Establish Pell Grant Eligibility for Quality Career Pathway Short-Term Credentials**

The results from this study suggest that purposeful embedded credential career pathways lead to economic gains for participating students. Employers also benefit from the model by acquiring skilled labor to meet their workforce needs. Currently, Pell Grant eligibility does not extend to some of the short-term credentials within the career pathway model. This is especially impactful in the two-year college sector as low-income students are more likely to enroll in two-year institutions compared to four-year institutions (Cohen et al., 2014). Policymakers should engage in motions to extend Pell Grant eligibility to financially disadvantaged students enrolled in career pathway short-term credentials that are developed through employer insights and rigorous labor market analysis. This action would provide incoming students with the financial resources to participate in industry relevant career pathway credentials that lead to economic self-sufficiency and strengthen the talent pipeline for employers.

Guiding Questions

- What role do employers play in the development and maintenance of career pathway offerings?
- Do college student success key performance indicators include graduate employment outcomes?
- What is the college process for career pathway program review? Who is involved in the program review process? How often does program review occur? How does the college determine when a career pathway program needs to be modified or discontinued?
- How does the college build awareness of career pathway programs? How does the college build awareness of career pathways among minoritized communities?

Additional Resources

- WTCS Career Pathways Self-Assessment
- WTCS Embedded Technical Diploma and WTCS Career Pathway Certificate Program Development Forms
- The Aspen Institute's Workforce Playbook
- CLASP's Alliance for Quality Career Pathways

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Appendices

Methods

McNemar tests were utilized to assess the significance of differences in employed and employed related rates between the completion of each credential in a career pathway. McNemar tests were selected due to the binary and mutually exclusive nature of the dependent variables, i.e. employed or not employed and employed related or not employed related, and the test's function to compare data across two points in time.

To assess the change in employed related yearly salary as a student progresses along a career pathway, repeated measure t-tests were conducted to assess mean earnings. The repeated measure t-test was selected due to the continuous nature of the dependent employed related earnings variable, and the test's function to compare the employed related earnings across the completion of each credential within a career pathway.

ANOVA tests were conducted to better understand the interactions between advancing along a career pathway and student characteristics in relation to employed related mean yearly salary. The ANOVA test was selected due to the continuous nature of the dependent employed related earnings variable, and the test's function to compare the employed related earnings across the completion of each credential within a career pathway.

Supplemental Tables

The below tables present statistics of embedded credential employment outcomes. If fewer than ten student records with associated employment outcome data were available within the sample, an annotation of "Small Sample" is presented. Due to this study's statistical methods, employed, employed related, and employed related mean yearly salary were analyzed. Employed related median yearly salary is presented in the tables, but statistical significance is not assessed. A single asterisk * signifies a statistically significant difference (p-value < .05) in the employment outcome when comparing the outcome after completion of the Embedded Technical Diploma to after completion of the next credential in the career pathway. A double asterisk ** signifies a statistically significant difference using a Bonferroni p-value of .004. A Bonferroni p-value is a more conservative approach to testing for statistical significance that accounts for multiple testing within the analysis.

Economically Disadvantaged Status:

Employment Indicator	Economically Disadvantaged Completion of Embedded Technical Diploma	Economically Disadvantaged Completion of Next Credential in Career Pathway	Not Economically Disadvantaged Completion of Embedded Technical Diploma	Not Economically Disadvantaged Completion of Next Credential in Career Pathway
Employed	94%	95%	91%	97%**
Employed Related	71%	92%**	73%	89%**
Employed Related Mean Yearly Salary	$31,937	$49,511**	$36,094	$45,887**
Employed Related Median Yearly Salary	$34,837	$50,858	$30,158	$45,756

Effect	df	F	Sig.
Pathway Progression	1	49.9	<.004**
Economically Disadvantaged	1	0.0	0.89
Pathway Progression * Economically Disadvantaged	1	4.0	<.004**

Gender:

Employment Indicator	Female Completion of Embedded Technical Diploma	Female Completion of Next Credential in Career Pathway	Male Completion of Embedded Technical Diploma	Male Completion of Next Credential in Career Pathway
Employed	94%	97%	89%	94%*
Employed Related	72%	94%**	72%	85%**
Employed Related Mean Yearly Salary	$33,564	$50,328**	$35,123	$43,452**
Employed Related Median Yearly Salary	$33,797	$50,98	$30,158	$41,597

Effect	df	F	Sig.
Pathway Progression	1	43.9	<.004**
Gender	1	2.0	0.16
Pathway Progression* Gender	1	5.0	0.03*

Career Pathway Career Cluster:

Employment Indicator	Health Sciences Completion of Embedded Technical Diploma	Health Sciences Completion of Next Credential in Career Pathway	Information Technology Completion of Embedded Technical Diploma	Information Technology Completion of Next Credential in Career Pathway
Employed	96%	98%	87%	94%**
Employed Related	73%	97%**	69%	78%**
Employed Related Mean Yearly Salary	$37,799	$53,655**	$37,268	$44,330**
Employed Related Median Yearly Salary	$36,605	$54,434	$35,762	$42,117

Employment Indicator	Manufacturing Completion of Embedded Technical Diploma	Manufacturing Completion of Next Credential in Career Pathway	Business, Management and Administration Completion of Embedded Technical Diploma	Business, Management and Administration Completion of Next Credential in Career Pathway
Employed	85%	90%**	83%	95%**
Employed Related	74%	87%**	68%	77%**
Employed Related Mean Yearly Salary	$33,197	$38,297**	Small Sample	Small Sample
Employed Related Median Yearly Salary	$31,198	$37,437	Small Sample	Small Sample

Employment Indicator	Law, Public Safety and Security Completion of Embedded Technical Diploma	Law, Public Safety and Security Completion of Next Credential in Career Pathway
Employed	95%	97%
Employed Related	70%	78%**
Employed Related Mean Yearly Salary	Small Sample	Small Sample
Employed Related Median Yearly Salary	Small Sample	Small Sample

Effect	df	F	Sig.
Pathway Progression	1	15.8	<.004**
Career Cluster	2	8.2	<.004**
Pathway Progression * Career Cluster	2	1.6	0.21

Age:

Employment Indicator	Younger than 25 Completion of Embedded Technical Diploma	Younger than 25 Completion of Next Credential in Career Pathway	25 or Older Completion of Embedded Technical Diploma	25 or Older Completion of Next Credential in Career Pathway
Employed	90%	97%**	94%	95%
Employed Related	74%	88%**	70%	92%**
Employed Related Mean Yearly Salary	$28,440	$43,100**	$39,385	$51,703**
Employed Related Median Yearly Salary	$27,558	$41,597	$37,145	$51,283

Effect	df	F	Sig.
Pathway Progression	1	54.3	<.004**
Age Group	1	28.5	<.004**
Pathway Progression * Age Group	1	0.4	0.52

Race/Ethnicity:

Employment Indicator	Students of Color Completion of Embedded Technical Diploma	Students of Color Completion of Next Credential in Career Pathway	White Completion of Embedded Technical Diploma	White Completion of Next Credential in Career Pathway
Employed	92%	94%	92%	96%*
Employed Related	62%	86%**	74%	91%**
Employed Related Mean Yearly Salary	$30,262	$45,159**	$34,796	$47,945**
Employed Related Median Yearly Salary	$32,099	$43,677	$33,899	$49,043

Effect	df	F	Sig.
Pathway Progression	1	14.9	<.004**
Race/Ethnicity	1	1.0	0.31
Pathway Progression * Race/Ethnicity	1	0.1	0.81

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