

Students with Disabilities in CTE: Post High School Success

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Abstract

This study was conducted using quantitative methods to determine if a relationship exists between Career and Technical Education (CTE) concentrators with disabilities' Technical Skill Assessment (TSA) performance and their attaining related placement after high school. The study included data from 65,606 Missouri students who graduated during the years 2015-2019. To investigate the relationship between TSA assessment performance and attaining related placement, multiple descriptive models were run in aggregate and individually by CTE program area. The data reveal students who pass their TSA assessment are more likely to attain related placement compared to those not passing their assessment. Students with disabilities (SWDs) had substantially lower rates of passing their TSA assessment and attaining related placement. Additional analysis to determine the relationship between students' TSA assessment performance and attaining related placement involved multiple binary logistic regression models. The logistic regression models helped determine that SWDs are less likely to attain related placement when compared to students without disabilities. Two exceptions were found when analyzing the findings by CTE program area. SWDs from Agriculture and Marketing programs attained related placement at a rate close to those without disabilities. Also noteworthy, SWDs who passed their TSA assessment were more likely to attain related placement than the SWDs who failed their TSA assessments. The findings from this study may add merit to the numerous secondary CTE programs in the United States and how these can offer multiple benefits to students with disabilities.

Keywords: Students with disabilities, transition, technical skill attainment, TSA, TSA assessment, career and technical education, CTE, related placement, CTE accountability measures, industry-recognized credential

Introduction

In Missouri, the Missouri Department of Elementary & Secondary Education (MODESE) decided to use the Missouri Career and Technical Education Certificate (CTEC) as one option

for school districts to meet the requirement of preparing “Success-Ready” students. The Technical Skill Assessment (TSA) plays a significant role in the CTEC as it is one of the required criteria for a student to earn the CTEC. This new state accountability measure is a component of the Missouri School Improvement Program 6 (MSIP 6), which started in August 2020 (MODESE, 2020).

Questions remain however, such as, when a student achieves a certain level on the TSA, what benefits do they realize? Is the achievement a simple grade in the teacher’s grade book, or does it open doors that would not have been there without it? Is there a relationship between students passing the TSA and success after high school? Are all students achieving an appropriate level of success?

Purpose of the Study

The purpose of this study was to determine the relationship, if any, between technical skill assessments (TSAs) and post-high school related placement for CTE students in Missouri between the years 2015-2019 with and without an IEP. Furthermore, this study sought to determine if those students with an IEP who passed their TSA, were as likely to be placed in related employment, post-secondary education, or in the military as those who did not pass their TSA.

Based on this purpose, the following research questions were proposed for this study:

Research Questions

1. Is there a relationship between Missouri CTE students with an IEP who pass their TSA assessment and the attainment of employment, entering post-secondary education, or the military in a field related to their CTE program?
2. Is the relationship different among CTE programs for students with an IEP who pass their TSA assessment and the attainment of employment, entering post-secondary education, or the military in a field related to their CTE program?

Theoretical Framework

The Social Cognitive Career Theory (SCCT) is a developmental approach that focuses on “how an individual’s self-concept becomes a vocational concept” (Swanson & Fouad, 1999, p. 5) and provides a developmental model to view career choice behaviors. Bandura’s (1986) Social Cognitive Theory provides the foundation for the Social Cognitive Career Theory and focuses on the personal attributes of self-efficacy, outcome expectations, and personal goals (Lent & Brown, 1996; Lent et al., 1996). Interacting with these Social Cognitive variables, SCCT conceptualizes career-related interest, choice, and performance processes as interlocking, segmental models.

Outcome expectations are personal beliefs about consequences for performing particular behaviors. These include external reinforcement (tangible rewards for successful performance), self-directed outcomes (confidence in oneself), and outcomes from performing a given task (Lent et al., 1996). Outcome expectations in career decision making are significant, especially for students with IEPs, as perceptions from prior experience and information one acquires about career fields can impact choices (Lent et al.; Lent & Brown, 1996).

SCCT states that individuals form an enduring interest in activities where they perceive themselves as competent and produce a valued outcome (Lent & Brown, 1996). As interests in a particular activity develop that a person believes can be performed well (self-efficacy) and expect to perform it well (outcome expectation), then the individual is likely to uphold a particular goal or become more involved in the activity. In this way, a possible career interest is developed. This process changes over the lifespan, although occupational interests tend to stabilize in the teenage and early adult years (Lent & Brown; Lent et al., 1996).

Career related processes are concerned with two aspects of performance, the level or quality of a person's accomplishments and persistence in a work activity or career path (Lent & Brown, 1996; Lent et al., 1996). Ability affects performance by impacting self-efficacy and outcome expectations (Lent & Brown; Lent et al.). If the student's self-efficacy is low, however, the student can perceive greater barriers to career success (Smith, 2001).

Career choices then, may not reflect personal interest, but instead avoidance of obstacles or perceived barriers (Smith, 2001). Personal and contextual variables, such as race/ethnicity, gender, physical health/disability, socioeconomic status, and genetic endowment are assumed to influence the social cognitive variables (self-efficacy, outcome expectations, occupational goals) and the career development process (Lent et al., 1996). Therefore, specifically examining IEP students' performance on TSAs related to their post-high school placement can provide some insight to how well CTE programs are providing career equity and access for all students.

CTE and Transition

Under IDEA, transition services are defined as a "coordinated set of activities for a child with a disability that are a results-oriented process and meet academic and functional needs" (Individuals with Disabilities Education Act, 2004). One purpose for the Strengthening Career and Technical Education for the 21st Century Act (Perkins V) is to increase the employment opportunities for populations chronically unemployed or underemployed, including those with disabilities (Hyslop, 2018). Studies have shown that CTE is a best practice for students with disabilities (SWD) and should be included as a major component of transition services (Schmalzried & Harvey, 2014). However, students with disabilities (SWD) are not a homogeneous group, as disability or disabilities can vary by type and severity (Brand et al., 2013). SWDs have a variety of "academic and transition abilities, needs, and potentials based on the type and severity of disability" (Lee et al., 2016, p. 79).

While CTE is a promising practice for the transition plans of SWDs, there are persistent concerns about IEP implementation. Communication between CTE teachers and special educators is critical to student success, yet many CTE professionals do not know who is responsible for providing information on SWDs in CTE programs. Career and technical educators often are not present at IEP meetings, educators often have low expectations for SWDs, and transition plans can lack ongoing supports and services (Brand et al., 2013; Schmalzried & Harvey, 2014). There is a continued need for CTE and special education to collaborate to best meet the needs of SWDs in CTE programs (Schmalzried & Harvey, 2014; Wonacott, 2001).

The Relationship between CTE Assessments and Graduate Related Placement

In related studies using the same methodology, Plesnarski (2018) and Staklis and Klein (2010) examined if NOCTI end of course assessment performance was a valid predictor of acquiring related placement or post-secondary placement. Plesnarski found students who were advanced on the NOCTI exam were 1.396 times more likely to attain positive placement compared with students who earned a competent level. In Staklis's and Klein's study, prior to Plesnarski's, the same NOCTI assessment performance rating scale was used to predict the odds of post-secondary enrollment. Their findings had similar positive results. CTE students in Pennsylvania earning an advanced level on the NOCTI exam were 1.39 times more likely to enter post-secondary education. Students with assessment scores at the competent level had 1.28 times more likely odds of entering post-secondary education, and those at the basic level had 1.00 more likely odds.

In a smaller study, Ryan (2019) used a correlation methodology to determine if a relationship existed between CTE completers' TSA assessment performance and positive placement in Missouri. Ryan found a small moderate positive correlation between TSA assessment performance and positive placement after high school. These studies, however, did not examine the relationship between performance on TSA assessments for students with IEPs with related or positive placement.

Students with Disabilities (SWDs) and Post-secondary Success

There are concerns that among SWDs who graduate from high school and attend post-secondary education, completion rates are low. Brand et al. (2013) reported that only 40.7 percent graduated or received a degree within 8 years after high school compared to 52.4 percent of students without disabilities. Lee et al. (2016) also reported that overall employment rates for adults with disabilities were 15% lower than for those without a disability. There is positive evidence, however, that CTE can provide secondary SWDs effective employment and training services.

Research indicates that SWDs involved in CTE have lower dropout and higher graduation rates (Brand et al., 2013; Hehir et al., 2013) and have greater odds of full-time employment (Lee et al., 2016; Wagner et al., 2015). Despite the various needs, abilities, goals, and aspirations of SWDs, "CTE participation provides educational and post-school employment benefits for students with disabilities" (Harvey et al., 2020, p. 68).

Concentrating in a specific CTE program area may offer SWDs additional opportunities for success compared to those not taking a concentration of CTE courses. Lee et al. (2016) discovered, 62% of the SWDs who were CTE concentrators attained full-time employment compared to 40% to 44% of those not concentrating in CTE. Additionally, CTE concentrating SWDs were less likely to be unemployed or even work in part-time employment. Further validation of the findings relating to CTE concentrating SWDs was research from Theobald et al. (2017). Theobald et al. determined that SWDs who were also CTE concentrators were almost 2 percentage points more likely to be employed, more likely to graduate on time, and less likely to be absent from school. Finally, Wagner et al. (2015) found that SWDs who earned four or more CTE credits in high school were predicted to have increased their odds of securing full-time employment within two years after high school by 2.93.

Methods

This research used a quantitative research design and method of analysis to determine if a relationship existed between TSA performance and post-high school-related placement for CTE completers with IEPs. For this study, a CTE completer is defined as a CTE concentrator who graduates from high school or receives a General Education Diploma (GED). An ex post facto design utilizing binary logistic regression analysis was used to determine if a relationship existed between TSA performance and post-high school-related placement of CTE completers with IEPs.

According to Kleinbaum et al. (2008), “logistic regression analysis is the most popular regression technique available for modeling dichotomous dependent variables” (p. 604). Kleinbaum et al. also stated, “logistic regression helps determine how one or more independent variables are related to the probability of the occurrence of one or two possible outcomes” (p. 12). In relation to this study, the logistic regression helped determine the relationship between the independent variables of TSA performance and IEP status and the dependent variable of related placement.

Participants

To provide a clear description of the participants in this study, the crosstabs function within SPSS was used. Multiple models were built to help describe the participants. Table 1 presents a detailed breakdown of the participants’ demographic makeup. The total number of participants was N=65,606.

The trends over the 5-year period showed males as the largest participant gender, n=34,934 (53% of the total). Within race/ethnicity, the largest participant group was White, n=53,808 (82% of the total). As far as IEP status, participants without an IEP were a much larger group than those with an IEP, n=59,861 (91% of the total). Finally, students not disadvantaged were a larger group of participants, n=41,275 (63% of the total).

Table 1

Participant Demographics

Year	Demographic	Category	n	%	Total
5 Years	Gender	Males	34,934	53.2	N= 65,606
		Females	30,672	46.8	
	Race/Ethnicity	Asian	888	1.4	
		Black	6,823	10.4	
		Hispanic	2,621	4.0	
		Indian	284	0.4	
		Mixed Races	1,093	1.7	

	Pacific Islander	89	0.1
	White	53,808	82
IEP Status	No IEP	59,861	91.2
	Has IEP	5,745	8.8
SES Status	Not	41,275	62.9
	Disadvantaged		
	Disadvantaged	24,331	37.1

Instrumentation

The MODESE College and Career Readiness Data Supervisor was consulted to determine if the data required for this study were available and could be emailed with no identifiable information. A Microsoft Excel spreadsheet pre-populated with headings identical to the MODESE data file-set codes was developed that met the data supervisor's request. Data requested were downloaded into this spreadsheet for analysis (MODESE, 2019).

Variables in the Study

The dependent variable in this study consisted of one dichotomous outcome variable, related placement. The independent variables included one predictor variable, TSA assessment status, and one categorical independent variable: IEP status. The TSA assessment status and placement status coding returned on the Excel spreadsheet were dichotomous nominal variables. In order to run a Binary Logistic Regression, the nominal variables were converted into ordinal-ranked dichotomous variables consisting of 0s and 1s.

Procedures for Data Analysis

To answer research questions one and two, descriptive statistics and binary logistic regression models were run. The total numbers and percentages of IEP and non-IEP students passing or not passing their TSA assessments and then entering employment, the military, or continuing education related to their CTE program area, were presented for each research question. To determine if a relationship existed between CTE students with IEPs who passed their TSA assessments and attainment of related placement, two binary logistic regression models were run for each research question. One set of two models for IEP and non-IEP students overall and another set of models for IEP and non-IEP students by CTE Program area.

The logistic regression models were used to determine the relationship between the dichotomous dependent outcome variable related placement and the dichotomous independent predictor variable TSA performance, which was pass/fail on the assessment. Odds ratios (OR) and the odds percentages of attaining related placement for each model were also determined using SPSS’s logistic regression functionality. Odds ratios were considered the odds of a participant attaining related placement when controlling for those who passed the TSA assessment and the other independent variables in each model. The odd ratios’ percentage increases or decreases

were presented to help clarify the results. To determine if the independent variable in the logistic regression models were significant the Wald test was utilized. For this study, Wald values less than $p < .05$ were considered statistically significant.

Findings

The first question, is there a relationship between Missouri CTE students with an IEP who pass their TSA assessment and the attainment of employment, entering post-secondary education, or the military in a field related to their CTE program? Table 2 presents the TSA assessment performance and placement relation results for students with IEPs and those not having an IEP. Among the group of students with IEPs, 57.6% passed their TSA assessments. Those without IEPs passed their TSA assessments at a rate of 76.3%.

This study’s focus, IEP and non-IEP students who passed their TSA assessment and attained related placement had similar results in aggregate. Students with IEPs who passed their TSA assessment and attained related placement, made up 60.6% of that category. Those students without an IEP who passed their TSA assessment and attained related placement, made up 78.1% of that category. From these data, it is apparent that students with IEPs who pass the TSA assessment more often attained related placement than those who failed the assessments. The results also show that students with IEPs are not as successful in attaining related placement compared to those without IEPs.

Table 2
TSA Assessment and Placement Results by IEP Status

			Placement Relation				Totals	
			Not Related Placement		Related Placement			
IEP Status			<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Has IEP	TSA	Failed Test	852	49.5%	1,585	39.4%	2,437	42.4%
		Passed Test	869	50.5%	2,439	60.6%	3,308	57.6%
	Total		1,721	100%	4,024	100%	5,745	100%
No IEP	TSA	Failed Test	4,196	29.7%	10,017	21.9%	14,213	23.7%
		Passed Test	9,926	70.3%	35,722	78.1%	45,648	76.3%
	Total		14,122	100%	45,739	100%	59,861	100%
Total	TSA	Failed Test	5,048	31.9%	11,602	23.3%	16,650	25.4%
		Passed Test	10,795	68.1%	38,161	76.7%	48,956	74.6%
	Total		15,843	100%	49,763	100%	65,606	100%

Table 3 presents the logistic regression results in two models or steps. Model A contains IEP status only. The results are shown for students with IEPs compared to those without IEPs. Students with IEPs had an odds ratio of .722. This signifies that the students with IEPs have odds of attaining related placement reduced by a factor of .722 or -28% compared to students without IEPs.

Model B in Table 3 adds passing the TSA assessment as a variable in the model. When passing the TSA is added to the model the OR for students with IEPs increases to .780. This signifies that when passing the TSA is accounted for in the model, students with IEPs' odds of attaining related placement increased from .722 to .780. Students with an IEP increase their odds of attaining related placement by .066, which equates to an almost 7% increase in the odds of attaining related placement when the TSA assessment is passed. Viewing the results from the perspective of comparing students without IEPs to those with IEPs, the results are concerning. When controlling for passing the TSA assessment, students without IEPs have an odds ratio of 1.28, which signifies over a 28% increase in the odds of attaining related placement compared to students with IEPs. An interesting result to point out is the differences of the effect to students with and without IEPs after adding passing the TSA assessment to the models. Students with IEPs' ORs increased (.722 to .780) when adding the TSA results compared to the students without IEPs ORs' which decreased (1.39 to 1.28).

Table 3
Logistic Regression Models by IEP Status

Variable	Model A				Model B			
	Odds Ratio	SE	95% CI	OR %	Odds Ratio	SE	95% CI	OR %
IEP (No IEP)	1.39*	.030	1.31-1.47	39%	1.28*	.031	1.21-1.36	28%
IEP (Has IEP)	.722*	.030	.680-.766	-28%	.780*	.031	.734-.828	-.22%
TSA (Passed TSA)	-	-	-	-	1.51*	.020	1.50-1.57	51%

* $p < .05$

Research question two was, is the relationship different among CTE programs for students with an IEP who pass their TSA assessment and the attainment of employment, entering post-secondary education, or the military in a field related to their CTE program? To address research question two, TSA assessment and related placement results were analyzed after using the crosstabs function within SPSS to display the appropriate outputs.

Table 4 presents IEP and non-IEP students' TSA performance, pass or fail, and related or not related placement disaggregated by CTE program area. Overall, the mean TSA pass rate for students with IEPs is $M=54.74\%$ with a standard deviation of $SD=18.11\%$. The mean TSA pass rate for students without IEPs is $M=72.6\%$ with a standard deviation of $SD=13.13\%$. The CTE programs with the highest rates for IEP students who passed their TSA were Health Sciences (80.4%), Agriculture (64.5%), Engineering (56.7%), and Skilled Technical Sciences (56.3%).

This study’s focus, IEP and non-IEP students who passed their TSA assessment and attained related placement revealed interesting results when disaggregated by CTE program. The CTE programs with the largest differential between those with and without IEPs are Marketing (-29.1%), FCS (-21.3%) Agriculture (-18.5%), and Skilled Technical Sciences (-18.2%). The CTE programs with the smallest differential between students with and without IEPs for the study’s focus group are Health Sciences (-3.7%) and Engineering (-6.0%).

From these data, it is apparent that students with IEPs who pass the TSA assessment more often attained related placement than those who failed the assessments within their field. The results also show that students with IEPs are not as successful in attaining related placement compared to those without IEPs across all CTE program areas.

Table 4
TSA Assessment and Placement Results by CTE Program Area and IEP Status

CTE Program				Not Related Placement		Related Placement		Totals	
				<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Ag	Has IEP	TSA	Failed Test	102	43.4%	218	32.7%	320	35.5%
			Passed Test	133	56.6%	448	67.3%	581	64.5%
	No IEP	TSA	Failed Test	604	19.3%	1,354	14.2%	1,958	15.4%
			Passed Test	2,532	80.7%	8,185	85.8%	10,717	84.6%
Business	Has IEP	TSA	Failed Test	85	52.5%	153	41.1%	238	44.6%
			Passed Test	77	47.5%	219	58.9%	296	55.4%
	No IEP	TSA	Failed Test	686	28.8%	1,806	25.0%	2,492	25.9%
			Passed Test	1,696	71.2%	5,422	75.0%	7,118	74.1%
Engineering	Has IEP	TSA	Failed Test	26	51.0%	29	38.2%	55	43.3%
			Passed Test	25	49.0%	47	61.8%	72	56.7%
	No IEP	TSA	Failed Test	444	40.7%	844	32.2%	1,288	34.7%
			Passed Test	647	59.3%	1,775	67.8%	2,422	65.3%
FCS	Has IEP	TSA	Failed Test	157	59.9%	283	46.5%	440	50.5%
			Passed Test	105	40.1%	326	53.5%	431	49.5%
	No IEP	TSA	Failed Test	518	27.0%	1,470	25.2%	1,988	25.6%
			Passed Test	1,403	73.0%	4,360	74.8%	5,763	74.4%
Health Sciences	Has IEP	TSA	Failed Test	32	32.0%	50	15.7%	82	19.6%
			Passed Test	68	68.0%	268	84.3%	336	80.4%
	No IEP	TSA	Failed Test	367	23.5%	937	12.0%	1,304	13.9%
			Passed Test	1,197	76.5%	6,903	88.0%	8,100	86.1%

CTE Program				Not Related Placement		Related Placement		Totals	
				<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Marketing	Has IEP	TSA	Failed Test	23	88.5%	59	76.6%	82	79.6%
			Passed Test	3	11.5%	18	23.4%	21	20.4%
	No IEP	TSA	Failed Test	574	68.8%	1,259	47.5%	1,833	52.6%
			Passed Test	260	31.2%	1,393	52.5%	1,653	47.4%
Skilled Tech	Has IEP	TSA	Failed Test	427	48.2%	793	41.6%	1,220	43.7%
			Passed Test	458	51.8%	1,113	58.4%	1,571	56.3%
	No IEP	TSA	Failed Test	1,003	31.4%	2,347	23.4%	3,350	25.3%
			Passed Test	2,191	68.6%	7,684	76.6%	9,875	74.7%
Totals	Has IEP	TSA	Failed Test	852	49.5%	1,585	39.4%	2,437	42.4%
			Passed Test	869	50.5%	2,439	60.6%	3,308	57.6%
	No IEP	TSA	Failed Test	4,196	29.7%	10,017	21.9%	14,213	23.7%
			Passed Test	9,926	70.3%	35,722	78.1%	45,648	76.3%

Table 5 disaggregates the logistic regression results by CTE program area. Model A presents the results for each predictor variable, IEP and TSA, individually. Model B presents the results when both IEP and TSA are entered into the model simultaneously. There are multiple interesting findings in Table 5. First, in Model A, there are non-significant findings related to non-IEP students from Agriculture and Marketing. These non-significant findings indicate that there is no statistically significant difference in the odds of IEP and non-IEP students attaining related placement in these fields. The remaining five program areas all have significant findings indicating that students without IEPs’ odds of attaining related placement are higher than those with IEPs. Additionally, in Model A, there are significant findings related to students with IEPs in Engineering, Health Sciences, and Skilled Technical Sciences. Students with IEPs in Engineering are .624 times as likely or a 38% decrease in the odds of attaining related placement than those without IEPs. Students with IEPs in Health Sciences are .634 times as likely or a 37% decrease in the odds of attaining related placement than those without IEPs. Students with IEPs in Skilled Technical Sciences are .686 times as likely or a 31% decrease in the odds of attaining related placement than those without IEPs.

Model A also presents the results for the variable passing the TSA assessment disaggregated by CTE program area. All program areas had statistically significant results, indicating students who pass their TSA assessments are more likely to attain related placement. Students in three program areas have significantly higher findings than the other four areas. Students in Marketing and Health Sciences who pass their TSA, have an OR of 2.43 and 2.29 respectively. This indicates that students from these programs are 2.43 and 2.29 times more likely to attain related placement when the TSA assessment is passed. Significantly lower but the third-highest program area is Skilled Technical Sciences. Students in Skilled Technical Sciences who pass their TSA are 1.51 times more likely to attain related placement.

Model B presents the results by CTE program area which includes IEP and passed the TSA assessment variables. These variables are entered into the logistic regression model simultaneously and do have an impact on the outcome variable attainment of related placement. Similar to the findings in Model A the variable IEP in Agriculture and Marketing results are not significant indicating when controlling for passing the TSA assessment there is no statistically significant difference in the odds of IEP and non-IEP students attaining related placement. Notable for the variable IEP, when controlling for TSA assessment, is the similar reductions in the odds of attaining related placement across every CTE program. Skilled Technical Sciences had the highest odds reduction of 4% while Engineering had the lowest at 2%. These results indicate that when passing the TSA assessment is entered into the model, the odds of attaining related placement for students with IEPs decreased across all CTE programs between 2 to 4 percent when passing the TSA assessment was included in the model.

Table 5
Logistic Regression Models by CTE Program Area and IEP Status

CTE Program	Model A: Variables Ran Individually					Model B: Variables Ran Together			
	Predictor Variable	Odds Ratio	SE	95% CI	OR %	Odds Ratio	SE	95% CI	OR %
Ag n=13,576	Has IEP	.932	.079	.799-1.08	-	1.01	.080	.862-1.18	-
	Pass TSA	1.46*	.050	1.32-1.61	46%	1.46*	.051	1.32-1.61	46%
Bus n=10,144	Has IEP	.757*	.097	.626-.915	-24%	.787*	.098	.650-.953	-21%
	Pass TSA	1.25*	.050	1.13-1.38	25%	1.24*	.051	1.12-1.37	24%
Engr n=6,789	Has IEP	.624*	.185	.432-.891	-38%	.639*	.185	.444-.919	-36%
	Pass TSA	1.46*	.073	1.27-1.68	46%	1.45*	.073	1.26-1.68	45%
FCS n=8,622	Has IEP	.766*	.078	.657-.893	-23%	.796*	.080	.681-.930	-20%
	Pass TSA	1.20*	.054	1.08-1.33	20%	1.17*	.055	1.05-1.30	17%
H.Sci. n=9,822	Has IEP	.634*	.118	.503-.799	-37%	.664*	.119	.526-.839	-34%
	Pass TSA	2.29*	.067	2.01-2.61	129%	2.28*	.067	1.20-2.59	128%
Mkt n=3,589	Has IEP	.931	.230	.593-1.46	-	1.16	.233	.736-1.84	-
	Pass TSA	2.43*	.083	2.06-2.86	143%	2.44*	.084	2.07-2.88	144%
S.Tech n=16,061	Has IEP	.686*	.045	.627-.750	-31%	.734*	.046	.671-.804	-27%
	Pass TSA	1.51*	.039	1.40-1.63	51%	1.45*	.039	1.34-1.57	45%

*p<.05

Discussion

The combined student results related to research question one showed that a large majority of all students, those with and without IEPs, passed their TSA assessments and attained related

placement. When the results for the total number of students are separated by IEP status, major disparities are evident. The 76% TSA pass rate for students without IEPs compared to the 58% pass rate for students with IEPs is a concern. The positive results relating to TSA assessment performance and attaining related placement of students with IEPs help validate the achievement of technical skills attainment through passing a TSA assessment. Students with IEPs who passed their TSA assessment and attained related placement was 60.6% compared to those not passing their TSA assessment but still attaining related placement at 39.4%. The 21.2% higher rate of attaining related placement for the IEP students who pass the TSA assessment is noteworthy. These findings further validate the research of Lee et al. (2016), Theobald et al. (2017), and Wagner et al. (2015). SWDs who concentrate in CTE coursework are more likely to be successful after high school. Passing a TSA assessment increases the likelihood of success after high school.

The logistic regression analysis used in research question one provided an odds ratio (OR) or predictive relationship between the variables. The analysis revealed that students with an IEP are less likely to attain related placement compared to those without IEPs. Essentially, students without IEPs had increased chances or odds of attaining related placement by a factor of 1.39 compared to students with IEPs whose chances or odds were reduced by a factor of .28. When passing the TSA assessment was accounted for in the model, the results still revealed an odds reduction but it was less, going from .722 up to .780. SWDs who concentrate in CTE coursework and pass their TSA assessments have the potential to be most successful after graduating high school.

The findings related to research question two, which disaggregated the data by CTE program area, showed some positive and negative results. The CTE programs with the highest TSA assessment pass rates for SWDs coincide with the overall pass rates. Health Sciences, Agriculture, Engineering, and Skilled Technical Sciences students with IEPs and those without IEPs had the highest pass rates. These findings are more than likely a result of the industry-aligned and focused curriculum and assessments commonly used in each of these program areas.

The logistic regression models used in research question two show concerning results relating to the IEP students' odds of attaining related placement when compared to those without IEPs. Students with IEPs in every CTE program area had lower odds of attaining related placement when compared to those without disabilities. These results are caused by the lower than desired TSA pass rates students with IEPs have compared to their counterparts. Encouraging results are found when passing the TSA assessment is added in Model B of Table 5. When passing the TSA assessment is added, students with IEPs within every CTE program area had increased odds of attaining related placement. This information adds value to CTE assessments as a possible avenue to prepare all CTE students for success after high school.

Implications

Results of this research indicate that students with IEPs who pass the TSA have greater odds of post-secondary success. Across all content areas passing the TSA resulted in greater odds for related placement for students with IEPs. As other studies have found (Lee et al., 2016; Theobald et al., 2017; Wagner et al., 2015), CTE is a best practice for students with disabilities.

The non-statistically significant findings between non-IEP and IEP students for Missouri Agriculture and Marketing programs in the logistic regression models should be noted. These findings revealed that IEP students in these programs across the years studied, attained related placement near the same rate as their non-IEP peers. Additional questions are raised in this finding however, as we are unsure what may be happening within these programs compared to other CTE content areas. Are teachers differentiating instruction more effectively? Are the students placed in these programs a better “fit” than those in other programs? Additional research should seek to determine how these programs are achieving this equity so it can be replicated in other CTE content areas.

While some of these findings are encouraging for students with IEPs who pass the TSA across all CTE content areas, there are some concerns raised as well. Students with IEPs who passed their TSA still attained related placement 18% less frequently than their non-IEP peers. Is this related to their ability or perceptions among employers hiring students? Does this mean IEP students are less effective in communicating their knowledge and skills? Determining reasons for this discrepancy can assist educators in better preparing IEP students with additional tools to gain positive placement.

Particularly in Engineering, Health Sciences, and Skilled Technical Sciences, students with IEPs are not fairing as well as their non-IEP peers. The differences between these programs and Agriculture and Marketing programs should be examined more closely to determine the causes for these differences. In Missouri, oftentimes Agriculture and Marketing teachers have a more traditional teacher preparation, whereas teachers in Engineering, Health Sciences, and Skilled Technical Sciences are alternatively certified. Could this preparation impact the expectations teachers have of students? Or are the students’ disabilities not a positive match for the field the student has selected? Additional research should explore the differences between CTE content areas.

As a quantitative study, this research provides a snapshot of how well Missouri is providing SWDs opportunities for career success and where additional work may still be needed. This study did not examine communication between CTE teachers and special educators, expectations CTE teachers have of their students, or CTE teachers’ knowledge of IEPs and transition plans, all interplaying variables of students’ self-efficacy beliefs. Future studies should examine the mediating role of the CTE teacher in the career preparation of students with IEPs in Missouri.

Support systems for students with disabilities in CTE programs should also be examined. Given the finding that students with IEPs who pass the TSA are attaining related placement more often than those who fail the assessments, educators should work to scaffold learning for CTE concentrators with IEPs to attain this goal. Every effort should be made to remove barriers and provide necessary support to SWDs in CTE programs to successfully complete the TSA. This study indicates that earning that CTE credential prior to the end of high school is having a positive impact on students' post-secondary success.

Summary

The mixed findings of this study indicate that while some CTE content areas are starting to provide equitable career preparation for CTE students with IEPs, there is still work to be done. High quality CTE programs should be free of bias, inclusive, and non-discriminatory for all students, including those with disabilities. While the data indicate some achievements have been attained in this area, CTE programs need to continue to eliminate barriers, maintain and even increase supportive services, and seek additional resources to provide accommodations and modifications for all students to be "Success Ready" through CTE programs of study.

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