Journal of Career and Technical Education
2026, Vol. 41, No. 1

Exploring Perceptions of Career Growth and Employability Skills Outcomes Among Career and Technical Education Program Graduates

Jamie L. Molina
New Mexico State University

Karen L. Alexander
Texas Tech University

Cynthia L. Miller
Texas Tech University

Kyle L. Roberson
Texas Tech University

Melanie D. Schmitt
Texas Tech University

Abstract

Career and Technical Education (CTE) is often misperceived as a pathway solely for students not pursuing higher education, a misconception that reinforces stigma and hinders program development**.** This quantitative study examined how high school CTE programs influence postsecondary outcomes for 1,085 Texas graduates, focusing on perceptions of preparedness, employability skills, and career alignment. Using a researcher-developed instrument, the study measured graduates' views on curriculum relevance, access to facilities and technology, career and technical student organization participation, and work-based learning. It also assessed employability skills using the U.S. Department of Education's Employability Skills Framework and social-emotional competencies from the Collaborative for Academic, Social, and Emotional Learning (CASEL) framework. Key findings revealed that 86.5% of graduates pursued careers aligned with their CTE programs, with Science, Technology, Engineering, and Math (STEM) (95.6%) and Information Technology (92.8%) showing the highest alignment. Graduates whose careers required certifications demonstrated higher career alignment (90.9%) than those without certification requirements (69.2%). Students in career-aligned paths also reported higher preparedness scores ($M = 3.80$) than non-aligned peers ($M = 3.62$, $p = .007$). No significant differences emerged in social-emotional or employability skills. A key limitation of this study is the non-representative sample (83.5% White), which constrains generalizability to the broader Texas CTE population. In addition, the Preparedness construct demonstrated low internal consistency ($a=.64$), limiting confidence in preparedness-related findings. Together these factors restrict the scope of interpretation and the strength of resulting recommendations.

Keywords: Career and Technical Education; programs of study; Collaborative for Academic, Social, and Emotional Learning; Employability Skills Framework; career alignment; industry certifications

Introduction

Career and Technical Education (CTE), formerly known as vocational education, originated with the Smith-Hughes Act of 1917, the first federal investment in secondary vocational programs focused on agriculture, trade, industry, and home economics (ACTE, 2019; Hersperger et al., 2013). Over time, federal support expanded, most notably through the Carl D. Perkins Vocational Education Act of 1984, named after Congressman Carl Perkins of Kentucky, a key advocate for educational equity (Damron, 1990). This legislation has since been reauthorized as Perkins II (1990), Perkins III (1998), Perkins IV (2006), and most recently, Perkins V (2018), now titled the Strengthening Career and Technical Education for the 21st Century Act (ACTE, 2019).

Under Perkins V, states must submit a comprehensive Perkins State Plan, including a local needs assessment and implementation of programs of study—structured course sequences that integrate academic, technical, and real-world experiences aligned with industry needs (Texas Education Agency [TEA], 2020). Texas currently supports 14 career clusters, 53 Statewide Programs of Study, and 8 Regional Programs of Study (TEA, 2020). These initiatives aim to expand opportunities for students to earn industry-based certifications, postsecondary credentials, and workforce readiness skills.

Today's CTE is far more comprehensive than traditional shop or home economics courses. It prepares students for careers across 16 national career clusters through pathways that may include two- and four-year degrees, work-based learning, and professional certification (Advance CTE, 2023). In Texas, Perkins V emphasizes quality indicators and rigorous course progression, particularly through advanced level three and four courses with prerequisite requirements (TEA, 2020).

According to ACTE (2019), CTE not only supports academic achievement and reduces dropout rates, but also enhances critical skills such as communication, time management, research, and problem-solving. Despite the documented benefits, more research is needed on the long-term career outcomes of CTE graduates. Understanding graduate perspectives on career growth and employability skills will be vital to guiding future program development. This study investigates how CTE programs influence career alignment, preparedness, employability skills, and social-emotional outcomes among Texas graduates.

Theoretical Frameworks

Social Cognitive Career Theory and Career Development Theory

Social Cognitive Career Theory (SCCT) explains career development through self-efficacy, expected outcomes, and goals (Lent et al., 2002). Self-efficacy involves beliefs about one's abilities; outcomes are beliefs about the consequences of actions; and goals are intentions to

pursue activities. SCCT aligns with the career growth of CTE graduates, showing how exposure to career experiences shapes career choices, goals, and interests.

This study also aligns with Donald Super's Career Development Theory (CDT), which views career development as a life-span process influenced by social experiences and personal values (Kosine & Lewis, 2008). High school CTE graduates have engaged in Super's exploration stage (ages 15-24), where they "try out" careers through classes, work experiences, and hobbies, often within CTE programs of study.

Purpose and Research Questions

This study examined the perceptions of high school CTE graduates' regarding how their programs of study impacted their career growth, including career preparedness, involvement in career and technical student organizations, access to facilities and technology, and work-based learning opportunities. It also explored graduates' views on employability skills—aligned with the U.S. Department of Education's Employability Skills Framework—which focuses on applied knowledge, relationships, and workplace skills essential for career readiness (Perkins Collaborative Resource Network, 2023b).

Additionally, the study examined graduates' social and emotional learning skills using the CASEL Framework, particularly its five core competencies: self-awareness, self-management, social awareness, relationship skills, and responsible decision-making (Collaborative for Academic, Social, and Emotional Learning [CASEL], 2020).

Research Questions (RQ)

This research addresses the following questions:

- RQ1: How many CTE graduates' postsecondary education and career plans align with their high school program of study?
- RQ2: What are the perceptions of CTE graduates' preparedness for that career because of their high school program of study?
- RQ3: How do industry certifications and employability skills outcomes relate to CTE graduates' career alignment with their high school programs of study?

Methodology

Population and Sample

This study received approval from the Institutional Review Board at Texas Tech University and was classified as exempt under federal regulation under 45 CFR 46 category 2.(i). This quantitative descriptive study analyzed data from a convenience sample of 1,085 participants out of 1,727,471 CTE students. Participants were recruited through CTE organizations, social media outlets, Education Service Centers, workforce boards, and Local Education Agencies (LEAs) across Texas, which has 1,207 LEAs (Texas Education Agency, 2022). The study participants were drawn from various locations across Texas and could have attended any respective LEAs ranging from extremely large to small. The sample was 83.5% White, which does not reflect

statewide Texas CTE demographics where Hispanic/Latino students comprise the majority. This demographic imbalance limits generalizability and requires cautious interpretation of findings and recommendations.

Data were collected through a researcher-developed survey that measured three constructs: Preparedness (items = 4, (α) = .614), Social and Emotional Skills (items = 4, (α) = .614), and Employability Skills (items = 4, (α) = .614). Instrument item validity was achieved through CTE expert review and piloted with Education Service Center CTE Specialists and three non-CTE individuals. Table 1 illustrates sample data collected for the study.

Table 1

Sample Characteristics

Variable	*n*	*%*
What is your age group?		
18-21	427	39.35
22-25	511	47.10
26-29	144	13.27
Missing	3	0.28
What is your gender?		
Male	654	60.28
Female	370	34.10
Non-binary	35	3.23
Prefer not to say	25	2.30
Missing	1	0.09
Race		
American Indian or Alaska Native	30	2.76
Asian	25	2.30
Black or African American	59	5.44
Native Hawaiian and Other Pacific Islander	7	0.65
White	906	83.50
Hispanic or Latino	35	3.23
Two or more races	22	2.03
Missing	1	0.09
Do you know the CTE Career Cluster that you followed in high school?		
Yes	1003	92.44
No	82	7.56
Missing	0	0.00
Which CTE Career Cluster were you likely enrolled in, or did you enroll in?		

Agriculture, Food, and Natural Resources	92	8.48
Architecture and Construction	78	7.19
Arts, Audio/Video Technology, and Communications	98	9.03
Business, Marketing, and Finance	97	8.94
Education and Training	76	7.00
Energy	57	5.25
Health Science	71	6.54
Hospitality and Tourism	54	4.98
Human Services	45	4.15
Information Technology	111	10.23
Law and Public Service	43	3.96
Manufacturing	35	3.23
Science, Technology, Engineering, and Mathematics (STEM)	180	16.59
Transportation, Distribution, and Logistics	37	3.41
Unsure	11	1.01
How many courses did you take within your CTE program?		
1	398	36.68
2	380	35.02
3	165	15.21
4	113	10.41
5+	25	2.30
Unsure	4	0.37
Why did you choose to take these courses?		
Enjoy career pathway	898	82.76
To fill schedule	130	11.98
Missing	57	5.25
After high school graduation, did you or do you plan to pursue a career path aligned with your CTE program?		
Yes	939	86.54
No	141	13.00
Missing	5	0.46
Does your current or future career require the use of the certification(s) you earned in high school?		
Yes	786	72.44
No	184	16.96
I did not earn a certificate	112	10.32
Missing	3	0.28

Note. This table illustrates sample data collected in the study. This table summarizes

demographic and program-related characteristics of the study sample (N = 1,085). Participants reported on age group, gender identity, race, familiarity with their high school CTE career cluster, number of CTE courses completed, motivations for enrolling, career alignment intentions, and certification requirements. Percentages are calculated within each item category.

Sample Characteristics and Representativeness

Analyzing the sample characteristics reveals important patterns that must be considered when interpreting findings. Among study participants, 654 (60.3%) were male and 370 (34.1%) were female, which generally aligns with Texas CTE enrollment patterns, where males comprise slightly more participants (51.9%) than females (48.1%).

However, significant demographic differences emerged when comparing the sample to statewide CTE enrollment. The study sample was predominantly White (83.5%, n = 906), followed by Black or African American participants (5.4%, n = 59), while Hispanic or Latino participants comprised only 3.2% (n = 35) of the sample. This contrasts sharply with Texas CTE enrollment data, where Hispanic or Latino students represent the largest group (54.8%, n = 947,449), followed by White students (27.9%, n = 483,027) (Perkins Collaborative Resource Network, 2023a).

This demographic discrepancy suggests that the convenience sampling method may have systematically underrepresented Hispanic/Latino students, potentially due to differences in social media usage, organizational membership, or survey language preferences. Consequently, findings may not adequately reflect the experiences of the majority population in Texas CTE programs.

Regarding career cluster enrollment, STEM showed the highest participation in the sample (16.6%, n = 180), followed by Information Technology (10.2%, n = 111). While statewide data indicates Health Science as the most enrolled cluster, followed by STEM, the sample's emphasis on STEM and Information Technology may reflect recruitment through technology-oriented professional networks or organizations.

Critical Implications for Generalizability

These demographic discrepancies represent a major limitation that significantly restricts the applicability of study findings. The underrepresentation of Hispanic/Latino students—who comprise the majority of Texas CTE enrollment—means that results may not reflect the experiences, challenges, or outcomes faced by the largest population served by Texas CTE programs. Additionally, the overrepresentation of White students and underrepresentation of other racial/ethnic groups further limits generalizability.

Consequently, all findings should be interpreted as primarily applicable to White, predominantly male CTE graduates, particularly those in STEM and Information Technology fields, rather than representative of the broader, more diverse Texas CTE population. This limitation affects the external validity of all research questions and recommendations.

Instrumentation

The researcher-developed survey used a cross-sectional design to collect data at a single point in time. A 5-point Likert-type scale, adapted from the CASEL 5 and Employability Skills Frameworks, assessed participants' perceptions of how prepared they felt in their current careers based on their high school CTE experience. Participants completed the survey via Qualtrics, covering demographics, CTE programs of study, career preparedness, and perceptions of social, emotional, and employability skills development. Demographic categories aligned with Texas Education Agency (TEA) Perkins V reporting for comparison with annual TEA data.

A pilot study evaluated the survey's validity and feasibility, involving Texas Education Educational Service Center CTE Specialists who completed the survey as former CTE students within the past five years. The selection of this group ensured relevant feedback, and researchers adjusted based on the pilot results to enhance the instrument's validity. Given sample and early instrument development, this study should be considered exploratory and intended to guide future large scale research.

Results/Findings

Terminology Note

For clarity, this study uses the following terms consistently:

- **CTE Programs of Study**: Structured sequences of courses within career clusters that prepare students for careers and postsecondary education
- **Career Clusters**: The 14 broad occupational categories that organize CTE programs (e.g., STEM, Health Science, Information Technology)
- **Career Alignment**: Graduates pursuing careers related to their high school CTE program area

Data were collected using a researcher-developed instrument with three constructs: Preparedness, Social and Emotional Skills, and Employability Skills. Respondents rated their perceptions of preparedness in curriculum, involvement in career and technical student organizations, access to facilities and technology, and work-based learning using a 5-point Likert scale.

Instrument Reliability

Internal consistency was assessed using Cronbach's alpha for each construct. Because the Preparedness scale showed low reliability ($\alpha = .64$), findings related to that construct should be interpreted cautiously (George & Mallery, 2018). This questionable reliability indicates that the four items measuring preparedness may not consistently assess a single underlying construct.

In contrast, the Social and Emotional Skills scale ($\alpha = .87$) and the Employability Skills scale ($\alpha = .90$) demonstrated good to excellent internal consistency, indicating that these measures reliably assessed their respective constructs. The strong reliability of these scales supports confidence in findings related to social-emotional and employability skills outcomes.

Given these reliability limitations, conclusions about preparedness should be considered preliminary. Future research should consider developing separate measures for these preparedness components.

Table 2

Reliability Table for Preparedness, Social and Emotional Skills and Employability Skills

Scale	No. of Items	α	Lower Bound	Upper Bound
Preparedness	4	.64	.61	.67
Social and Emotional Skills	17	.87	.86	.88
Employability Skills	23	.90	.89	.90

Note. The lower and upper bounds of Cronbach's α were calculated using a 95.00% confidence interval.

Research Question One

Research question one examined the alignment between CTE graduates' postsecondary career plans and their high school CTE programs. Participants were asked whether they intended to pursue a career aligned with their CTE program after graduation. A chi-square test revealed a significant association between CTE program type and career alignment, $\chi^2(13) = 31.77$, $p = .003$, indicating that alignment varied across clusters.

Graduates from the STEM (95.56%, $n = 172$, 95% CI [91.37%, 97.93%]) and Information Technology (92.79%, $n = 103$, 95% CI [86.18%, 96.60%]) clusters reported the highest alignment rates. High alignment was also observed in Business, Marketing, and Finance (88.54%, $n = 85$), Architecture and Construction (88.31%, $n = 68$), Human Services (88.89%, $n = 40$), and Arts, Audio/Video Technology, and Communications (87.50%, $n = 84$). In contrast, lower alignment was reported in Hospitality and Tourism (74.07%, $n = 40$, 95% CI [59.67%, 85.06%]), Law and Public Service (79.07%, $n = 34$, 95% CI [63.25%, 89.66%]), and Health Science (80.28%, $n = 57$, 95% CI [68.57%, 88.58%]).

These findings suggest meaningful differences in postsecondary alignment across CTE programs of study. While certain clusters appear to support strong continuity into related careers, others may be influenced by additional factors such as labor market conditions, credentialing requirements, or student interests. Table 3 presents the complete alignment rates across all CTE program areas.

Table 3

Alignment of Post-Graduation Career Paths with CTE Programs of Study

CTE Program	Career Aligned		χ^2	*df*	*p*
	Yes	No			
Agriculture, Food, and Natural Resources	79 (85.87%)	13 (14.13%)	31.77	13	.003
Architecture and Construction	68 (88.31%)	9 (11.69%)			
Arts, Audio/Video Technology, and Communications	84 (87.50%)	12 (12.50%)			
Business, Marketing, and Finance	85 (88.54%)	11 (11.46%)			
Education and Training	65 (85.53%)	11 (14.47%)			
Energy	45 (80.36%)	11 (19.64%)			
Health Science	57 (80.28%)	14 (19.72%)			
Hospitality and Tourism	40 (74.07%)	14 (25.93%)			
Human Services	40 (88.89%)	5 (11.11%)			
Information Technology	103 (92.79%)	8 (7.21%)			
Law and Public Service	34 (79.07%)	9 (20.93%)			
Manufacturing	30 (85.71%)	5 (14.29%)			
Science, Technology, Engineering, and Mathematics (STEM)	172 (95.56%)	8 (4.44%)			
Transportation, Distribution, and Logistics	32 (86.49%)	5 (13.51%)			

Note. This table displays the alignment between participants' current careers and the CTE programs they completed in high school, disaggregated by CTE program area. Percentages represent the proportion of graduates within each cluster who reported career alignment. A chi-square test indicated a statistically significant association between CTE program area and post-graduation career alignment, $\chi^2(13) = 31.77$, $p = .003$.

Research Question Two

Research question two explored the perceptions of CTE graduates' preparedness for their careers because of their high school program of study. Based on the limited sample, these differences should be interpreted as tentative patterns rather than definitive group differences. An analysis of variance (ANOVA) was conducted to determine whether there were significant differences in Preparedness by the CTE program. The mean Preparedness score for Agriculture, Food, and Natural Resources (M = 3.89, SD = 0.85, 95% CI [3.71, 4.07]) was significantly higher than Energy (M = 3.46, SD = 0.73, 95% CI [3.26, 3.66]), with a moderate effect size (Cohen's d = 0.54, p = .021). Similarly, Energy scored significantly lower than both Information Technology (M = 3.93, SD = 0.60, 95% CI [3.81, 4.05], Cohen's d = 0.69, p = .004) and STEM (M = 3.96, SD = 0.61, 95% CI [3.87, 4.05], Cohen's d = 0.73, p < .001), representing moderate to large

effect sizes. Table 4 presents the ANOVA for preparedness by the CTE program, and Table 5 shows the mean, standard deviation, and sample size for preparedness by the CTE program.

Table 4

Analysis of Variance Table for Preparedness by CTE Program

Term	*SS*	*df*	*F*	*p*	η_p^2
CTE program	21.42	13	3.32	< .001	0.04
Residuals	521.84	1051			

Table 5

Mean, Standard Deviation, and Sample Size for Preparedness by CTE Program

Combination	*M*	*SD*	*n*
Agriculture, Food, and Natural Resources	3.89	0.85	92
Architecture and Construction	3.69	0.80	78
Arts, Audio/Video Technology, and Communications	3.67	0.73	98
Business, Marketing, and Finance	3.70	0.68	96
Education and Training	3.76	0.69	75
Energy	3.46	0.73	55
Health Science	3.63	0.70	71
Hospitality and Tourism	3.65	0.73	54
Human Services	3.77	0.72	45
Information Technology	3.93	0.60	110
Law and Public Service	3.62	0.86	43
Manufacturing	3.80	0.72	35
Science, Technology, Engineering, and Mathematics (STEM)	3.96	0.61	176
Transportation, Distribution, and Logistics	3.84	0.54	37

Note. M = mean; SD = standard deviation; n = sample size. Preparedness scores were measured on a 5-point Likert scale, with higher scores indicating greater perceived preparedness within each CTE program cluster.

Post-hoc

Post hoc tests were conducted between each group combination to examine the CTE programs' differences further. The Tukey HSD p-value adjustment was used to correct the effect of

multiple comparisons on the family-wise error rate. The mean of Preparedness for Agriculture, Food, and Natural Resources ($M = 3.89$, $SD = 0.85$) was significantly higher than that for Energy ($M = 3.46$, $SD = 0.73$), $p = .021$. The mean of Preparedness for Energy ($M = 3.46$, $SD = 0.73$) was significantly lower than for Information Technology ($M = 3.93$, $SD = 0.60$), $p = .004$, and significantly lower than for STEM ($M = 3.96$, $SD = 0.61$), $p < .001$. No other significant effects were found.

Research Question Three

Research question three examined how industry certifications and employability skills outcomes relate to CTE graduates' career alignment with their high school programs of study. A chi-square test revealed a significant association between certification status and career path alignment, $\chi^2(2) = 61.23$, $p < .001$. Among respondents whose careers required a CTE-related certificate, 90.94% (n = 713, 95% CI [88.63%, 92.82%]) reported pursuing a career aligned with their high school CTE program. In comparison, only 69.23% (n = 126, 95% CI [61.45%, 76.18%]) of those in careers that did not require certification reported alignment. Notably, even among graduates who did not earn certifications, a high percentage (87.39%, $n = 97$, 95% CI [79.35%, 92.77%]) reported that their current careers aligned with their CTE program of study. These findings suggest that while certification requirements are positively associated with career alignment, many graduates continue CTE-related career paths even in the absence of formal certification. Table 6 presents detailed alignment rates by certification status.

Table 6

Career Alignment with High School CTE Program Based on Certification Requirement

CTE Certificate Required	Career Aligned	Not Aligned	χ^2	*df*	*p*
Yes	713 (90.94%)	71 (9.06%)	61.23	2	< .001
No	126 (69.23%)	56 (30.77%)			
I did not earn a certificate	97 (87.39%)	14 (12.61%)			

The Chi-square test results indicated a statistically significant association between the requirement of certifications for one's career and alignment with their CTE program, $\chi^2(2) = 61.23$, $p < .001$. These findings suggest that certifications earned through CTE programs play a significant role in aligning career paths post-graduation. However, participants who did not earn or require certifications still pursued (or plan to pursue) career paths related to their CTE program, indicating that the benefits of CTE may extend beyond the acquisition of specific certifications.

Comparison of Preparedness, Social and Emotional Skills, and Employability Skills Across Career Alignment

Independent samples *t*-tests were conducted to examine whether the means of Preparedness, Social-Emotional Skills, and Employability Skills significantly differed between graduates who aligned their careers with their CTE program and those who did not. Table 7 presents a two-tailed independent sample t-test for preparedness by career alignment.

Table 7

Two-Tailed Independent Samples t-Test for Preparedness by Career Alignment

	Career Aligned			Not Aligned					
Variable	*M*	*SD*	*n*	*M*	*SD*	*n*	*t*	*p*	*d*
Preparedness***	3.80	0.71	932	3.62	0.70	139	2.71	.007	0.25
Social-Emotional	3.70	0.60	939	3.76	0.61	141	-1.05	.293	0.09
Employability	3.72	0.60	939	3.73	0.62	141	-0.30	.766	0.03

Note. N = 1071. Degrees of Freedom for the *t*-statistic = 1069. *d* represents Cohen's *d*.
*p<.05, **p<.01, ***p<.001

Participants with career paths aligned with their CTE program reported significantly higher mean perceived preparedness scores (M = 3.80, SD = 0.71) compared to those whose careers were not aligned (M = 3.62, SD = 0.70), $t(1069) = 2.71$, $p = .007$. The effect size of this difference was moderate (Cohen's d = 0.25). In contrast, no significant differences were found in the mean scores for social-emotional skills between the aligned (M = 3.70, SD = 0.60) and not aligned groups (M = 3.76, SD = 0.61), $t(1078) = -1.05$, $p = .293$, with a small effect size (Cohen's d = 0.09). Similarly, there was no significant difference in employability skills scores between participants with aligned (M = 3.72, SD = 0.60) and not aligned careers (M = 3.73, SD = 0.62 $t(1078) = -0.30$, $p = .766$, and a small effect size (Cohen's d = 0.03).

These findings suggest that the perception of preparedness is significantly higher for individuals whose careers align with their CTE programs. In contrast, social-emotional and employability skills did not differ based on career alignment.

Motivations for Selecting Career and Technical Education (CTE) Clusters

A Chi-square test of independence was conducted to determine whether there was a statistically significant association between the type of CTE program and motivation for selecting CTE courses. Motivations were categorized as "Enjoy career pathway" or "To fill the schedule." Table 8 shows the motivations for CTE program enrollment by career cluster.

Table 8

Motivations for the CTE Program

CTE Program	Motivation		χ^2	*df*	*p*
	Enjoy career pathway	To fill schedule			
Agriculture, Food, and Natural Resources	78 (88.64%)	10 (11.36%)	36.6	13	<.001
Architecture and Construction	64 (90.14%)	7 (9.86%)			
Arts, Audio/Video Technology, and Communications	73 (84.88%)	13 (15.12%)			
Business, Marketing, and Finance	65 (81.25%)	15 (18.75%)			
Education and Training	56 (78.87%)	15 (21.13%)			
Energy	45 (83.33%)	9 (16.67%)			
Health Science	57 (82.61%)	12 (17.39%)			
Hospitality and Tourism	44 (81.48%)	10 (18.52%)			
Human Services	34 (77.27%)	10 (22.73%)			
Information Technology	104(93.69%)	7 (6.31%)			
Law and Public Service	39 (92.86%)	3 (7.14%)			
Manufacturing	33 (94.29%)	2 (5.71%)			
Science, Technology, Engineering, and Mathematics (STEM)	171(96.07%)	7 (3.93%)			
Transportation, Distribution, and Logistics	30 (88.24%)	4 (11.76%)			

Note. This table displays participants' motivations for enrolling in their high school CTE program, categorized by career cluster. The two primary motivations were "Enjoy career pathway" and "To fill schedule." Percentages reflect the proportion of respondents within each program cluster selecting each motivation. A chi-square test revealed a significant difference in motivations across CTE programs, $\chi^2(13) = 36.6$, $p < .001$.

The Chi-square test results were significant based on an alpha value of .05, $\chi^2(13) = 36.26$, $p < .001$, suggesting that the CTE program and program motivation were related. The analysis revealed that participants enrolled in Architecture and Construction, Information Technology, Law and Public Service, Manufacturing, and STEM clusters were likelier to choose their CTE courses based on a genuine interest in the career pathway. Conversely, students in the Education and Training and Human Services clusters were less likely to select CTE courses based on genuine interests. These findings highlight the importance of aligning CTE programs with career interests to enhance engagement and satisfaction.

Conclusions

Preliminary findings reveal several patterns; however, these results should be understood within the exploratory nature of this study. Future research with more diverse samples and more reliable measures is needed to confirm these results. Within the constraints of this study's sample limitations and reliability concerns, several important patterns emerged that warrant attention from CTE stakeholders. Among the predominantly White sample of CTE graduates, those from STEM and Information Technology programs reported the highest career alignment, with over 94% pursuing careers matching their CTE studies. The most robust finding across all analyses was the strong association between industry certification requirements and career alignment, with 90.9% of graduates in certification-requiring careers reporting alignment compared to 69.2% of those in non-certification careers. However, these findings should be interpreted as primarily applicable to White CTE graduates and may not reflect outcomes for Hispanic/Latino students or other underrepresented groups who comprise the majority of Texas CTE enrollment.

In contrast, graduates from Law and Public Service, Hospitality and Tourism, and Health Science had lower alignment (80–81%). STEM graduates also felt more prepared than those in Arts, Audio/Video Technology, Communications, and Energy clusters. These findings highlight the importance of CTE certifications for career alignment, though many without certifications still pursued related careers, reflecting the broader benefits of CTE.

The highest enrollment was in STEM, followed by Information Technology. Of 1,085 participants, only 11 needed clarification on their high school career cluster. Course enrollment varied, with 398 participants taking one CTE course, 380 taking two, and 25 taking five or more. Most (898) chose courses because they enjoyed the career pathway, while 130 took them to fill their schedule. When asked about pursuing a career aligned with their CTE program, 939 responded yes, and 786 confirmed their careers required certifications earned in high school.

There was a significant difference across CTE Programs of Study regarding preparedness. The findings suggest that graduates from STEM and Information Technology Programs of Study exhibited the highest level of alignment. Over 94% of the respondents in these categories confirmed their career trajectories were aligned with their CTE program of study. On the other hand, graduates from Law and Public Service, Hospitality and Tourism, and Health Science programs reported comparatively lower alignment. A trend emerges in which STEM consistently leads to perceptions of employability skills and social and emotional learning outcomes among high school graduates.

Limitations

Major Methodological Limitations

This study faces two critical limitations that substantially affect the interpretation and generalizability of all findings. First, the Preparedness scale demonstrated inadequate internal consistency ($\alpha = .64$), falling below accepted reliability standards. Second, the sample demographics differ dramatically from the Texas CTE population, with White students

comprising 83.5% of participants versus 27.9% statewide, while Hispanic/Latino students represent only 3.2% of the sample versus 54.8% statewide. This demographic mismatch is not merely a limitation—it fundamentally restricts the applicability of findings to a small subset of the CTE population and may not reflect the experiences of many students served by Texas CTE programs.

Several limitations should be considered when interpreting these findings. First, this study employed convenience sampling through CTE organizations, social media, and educational networks, which may have introduced selection bias. Participants who responded may represent more engaged or successful CTE graduates, potentially inflating positive outcomes. Second, this cross-sectional design captured perceptions at a single time point and cannot establish causal relationships between CTE participation and career outcomes. Longitudinal research would better establish how CTE experiences influence career trajectories over time.
Third, all data were self-reported, which may be subject to social desirability bias or recall limitations, particularly for graduates reflecting on high school experiences. Future research should incorporate objective measures of career success and employer perspectives.

Finally, the study did not control for potentially confounding variables such as socioeconomic status, academic achievement, family background, or regional economic conditions that might influence both CTE participation and career outcomes.

Recommendations

The following recommendations are based on findings from a predominantly White sample and may require modification to address the needs of Hispanic/Latino students and other underrepresented groups who comprise the majority of Texas CTE enrollment. Within this exploratory context, these recommendations should be interpreted as preliminary and based on a limited sample.

For Local Education Agencies (LEAs)

Strengthen High-Performing Programs: Given the superior career alignment rates in STEM (95.6%) and Information Technology (92.8%) programs, LEAs should prioritize investment in these pathways. This includes updating equipment, enhancing teacher professional development, and expanding course offerings to accommodate growing student interest.

Address Underperforming Programs: Programs showing lower alignment rates—Law and Public Service (79.1%), Hospitality and Tourism (74.1%), and Health Science (80.3%)—require a systematic review. LEAs should conduct needs assessments involving industry partners, recent graduates, and current students to identify specific barriers to career alignment.

Expand Certification Opportunities: The strong association between industry certifications and career alignment (90.9% vs. 69.2%) indicates that all CTE programs should integrate relevant, industry-recognized certifications. LEAs should audit current certification offerings and work with industry partners to identify additional credentials that enhance student marketability.

Enhance Equity and Access: The demographic disparities in this study highlight the need for targeted outreach to underrepresented populations. LEAs should examine recruitment practices, course scheduling, transportation barriers, and cultural factors that may limit the participation of Hispanic/Latino and other minority students in CTE programs.

For CTE Educators

Improve Curriculum-Career Connections: Programs with lower preparedness scores should strengthen the explicit connections between coursework and career applications. This includes incorporating more industry professionals as guest speakers, increasing job shadowing opportunities, and using project-based learning aligned with workplace tasks.

Integrate Employability Skills: While social-emotional and employability skills demonstrated strong development across programs, educators should ensure these skills are explicitly taught and assessed rather than developed incidentally. Consider adopting structured frameworks for teaching communication, teamwork, and problem-solving skills.

Strengthen Industry Partnerships: Programs should establish formal partnerships with local employers to ensure curriculum relevance, provide work-based learning opportunities, and create pathways to employment. Regular advisory committee meetings should guide program updates and modifications.

For Policymakers

Funding Allocation: State funding formulas should prioritize programs demonstrating strong career alignment and industry partnership development. Additional resources should support programs needing improvement rather than penalizing them.

Data Collection Enhancement: Improve statewide data collection to track long-term career outcomes, not just immediate post-graduation plans. Implement systems to follow graduates for 3-5 years post-completion to assess actual career progression and earnings.

Teacher Preparation: Invest in CTE teacher preparation programs that emphasize both technical skills and pedagogical approaches specific to career education. Support ongoing professional development that keeps educators current with industry trends.

For School Counselors

Combat Stigma: Counselors should receive professional development on the benefits and career prospects of CTE pathways. They need current labor market data to effectively counsel students about high-demand, well-paying careers accessible through CTE.

Individualized Guidance: Use career interest inventories and aptitude assessments to help students identify appropriate CTE pathways rather than defaulting to college-preparatory tracks for all students.

Future Research Priorities

Longitudinal Studies: Conduct multi-year studies tracking CTE graduates' actual career progression, earnings, and job satisfaction to validate self-reported alignment perceptions.

Diverse Population Focus: Prioritize research with representative samples that adequately include Hispanic/Latino students and other underrepresented groups in CTE.

Program Improvement Research: Investigate specific interventions that improve career alignment in underperforming programs through quasi-experimental designs.

Employer Perspectives: Study employer satisfaction with CTE graduates and identify skills gaps from the demand side of the labor market.

References

Advance CTE. (2023, April 11). *Career clusters*. https://careertech.org/what-we-do/career-clusters/

Association for Career and Technical Education. (2019). *Brief history of CTE* [Infographic]. https://ctepolicywatch.acteonline.org/2019/06/updated-brief-history-of-cte-timeline.html

Collaborative for Academic, Social, and Emotional Learning (CASEL). (2020). *CASEL's SEL framework: What are the core competence areas and where are they promoted?* [Infographic]. https://casel.org/fundamentals-of-sel/what-is-the-casel-framework/

Damron, D. R. (1990). *The contributions of Carl D. Perkins on higher education legislation, 1948-1984* (Publication No. 9026931) [Doctoral dissertation, Middle Tennessee State University]. ProQuest Dissertations Publishing. https://www.proquest.com/docview/303879642?pq-origsite=gscholar&fromopenview=true&sourcetype=Dissertations%20&%20Theses

George, D., & Mallery, P. (2018). *IBM SPSS statistics 25 step by step*. https://doi.org/10.4324/9781351033909

Hersperger, S. L., Slate, J. R., & Edmonson, S. L. (2013). A review of Career and Technical Education research literature. *Journal of Education Research*, *7*(3), 157–179.

Kosine, N., & Lewis, M. (2008). Growth and exploration: Career development theory and programs of study. *Career and Technical Education Research*, *33*(3), 227–243. https://eric.ed.gov/?id=EJ863494

Lent, R. W., Brown, S. D., & Hackett, G. (2002). Social cognitive career theory. In D. Brown (Ed.) *Career choice and development* (4th ed., pp. 255–311). Jossey-Bass.

Perkins Collaborative Resource Network. (2023a, April 11). *About accountability*. U.S Department of Education. https://cte.ed.gov/accountability/about-accountability

Perkins Collaborative Resource Network. (2023b). *Employability skills framework*. U.S Department of Education. https://cte.ed.gov/initiatives/employability-skills-framework

Texas Education Agency. (2020). *Approved CTE programs of study*. https://tea.texas.gov/academics/college-career-and-military-prep/career-and-technical-education/cte-programs-of-study

Texas Education Agency. (2022). *Texas enrollment report*. https://tea.texas.gov/sites/default/files/enroll-2021-22.pdf

AUTHORS' NOTES

Jamie L. Molina, Ph.D., New Mexico State University. The author can be contacted at jamimoli@nmsu.edu

Karen L. Alexander, Ph.D., Texas Tech University. The author can be contacted at karen.alexander@ttu.edu

Cynthia L. Miller, Ph.D., Texas Tech University. The author can be contacted at cynthia.l.miller@ttu.edu

Kyle L. Roberson, Ph.D., Texas Tech University. The author can be contacted at kyle.roberson@ttu.edu

Melanie D. Schmitt, Ph.D., Texas Tech University. The author can be contacted at melanie.schmitt@ttu.edu