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Alignment Between High School Career and Technical Education and Postsecondary and Workforce Outcomes in Nevada

Technical Annex

This research was sponsored by the Institute of Education Sciences.

Annex

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RR-A4872-2

About This Annex

This annex provides supporting materials for the main report, which examines the pathways CTE students pursue after high school and the extent to which their college majors and industries of employment align with their high school CTE program of study. We describe the policy background, relevant literature, data sources, analytic samples, and methodology, and we present supplementary results.

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Funding

This study was supported by the Institute of Education Sciences at the U.S. Department of Education through grant R305S230005 to RAND. The opinions expressed are those of the authors and do not represent the views of the Institute, the U.S. Department of Education, or RAND.

Acknowledgments

We are extremely grateful to staff at the Nevada Department of Education and Nevada P-20 to Workforce Research Data System for sharing insights on the Nevada context and data. In particular, we thank Dr. Victor Wakefield, Peter Zutz, Anna Reynolds, Natalie Brown, Jake Miller, Cameron Carey, Sonali Bandyopadhyay, Nicole Goldschmidt, Craig Moebus, and several others who assisted with this project. We are grateful to Jason Lee, Roddy Theobald, and Rachel Rosen for reviewing this report and providing helpful feedback. In addition to engaging expert human peer reviewers, the quality assurance team used assistive artificial intelligence tools to suggest writing improvements to the authors.

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Appendix A. Background

In this appendix we summarize Nevada's Career and Technical Education (CTE) policy, the Nevada labor market context, and discuss prior research on CTE participation and postsecondary or workforce alignment.

Nevada CTE Policy

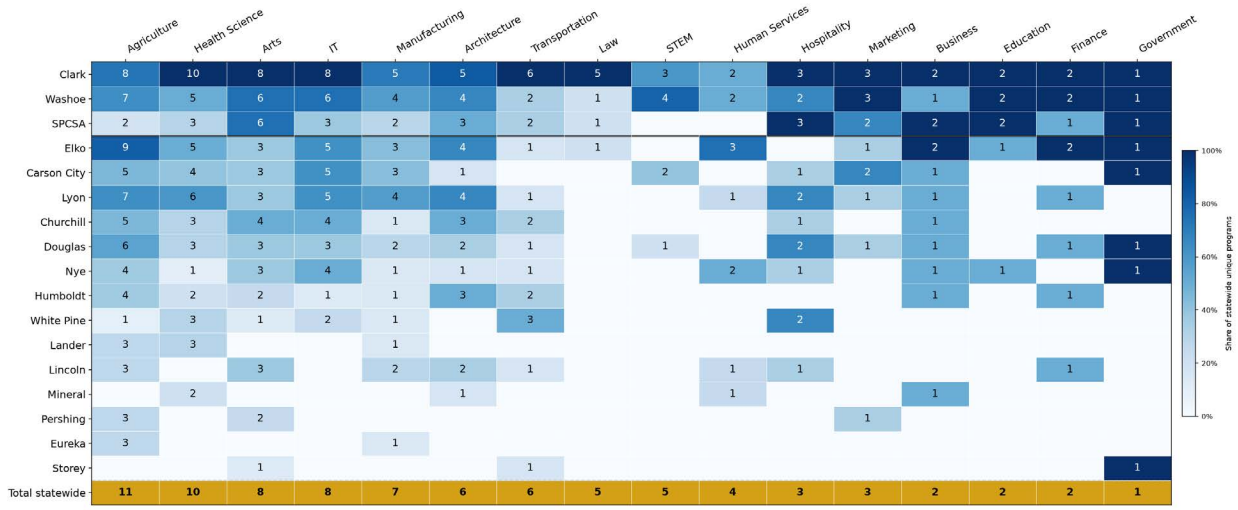
Local schools and districts offer CTE programs in Nevada, but the Nevada Department of Education sets programs of study and structures them under the federal Perkins V Act. Nevada's public K–12 system serves nearly 475,000 students, including 149,000 in grades 9–12 across 18 school districts (NDE, 2026). The system is highly concentrated geographically with three-quarters of students are enrolled in the Clark County School District or Washoe County School District (NDE, 2026). Approximately half of Nevada's high school students participate in at least one CTE course (NDE, 2024). While CTE participants broadly reflect the demographics of the state's student population, they are disproportionately male (authors' calculations from NDE, 2024; NDE, 2026).

During our sample period, Nevada organized CTE programs of study (POS) into 16 national career clusters, and most POS included three years of required coursework. In the 2021–22 school year, the state began gradually selecting programs of study to shorten to two years. Over a three-year process, the state sunset the three-year versions and replaced them with two-year versions, so that by the 2023–24 school year all students starting a CTE POS were beginning the two-year versions. A handful of students in our last cohort participated in the two-year versions initiated in 2021–22. However, the vast majority of the sample participated in the three-year versions.

Not every POS is available in every school; individual schools choose which approved programs to offer. Mihaly et al. (2025) documents some barriers to offering specific CTE courses, including limited availability of qualified instructors, space and equipment constraints, and lack of funding for CTE instructor professional development. Some schools also base course offerings on student demand. Students' access to CTE pathways varies considerably, particularly between the state's large urban districts, which offer a wide range of programs, and its rural districts, which have more limited offerings. Figure A.1 displays a heatmap of the number of programs of study with at least one enrolled student during the study period in each Nevada district, with shading based on the total number of programs of study available statewide for a particular career cluster.

Figure A.1. Share of Statewide CTE Programs Offered, by Career Cluster and District

(Urban = Clark, Washoe, and SPCSA; Rural = All Other Districts)



SOURCE: Nevada Department of Education CTE program participation data.
NOTE: Cell numbers show unique programs with at least one enrolled student in each district in that career cluster; shading reflects the district's count as a share of all unique programs available statewide in that cluster (darker = broader coverage). Urban districts are Clark, Washoe, and the Nevada State Public Charter School Authority (above the solid line). Districts are sorted within each group by total programs offered (descending). Career clusters are sorted left to right by the share of rural districts offering at least one program (descending). The 'Total statewide' row shows the number of unique programs available statewide in each cluster. SPCSA = State Public Charter School Authority.

Within the CTE system, the state classifies students under three different levels of CTE engagement. Students who complete two sequential courses within the same POS are designated CTE Concentrators under the federal Perkins V definition. Students who complete the full sequence of courses in a POS become Completers. Completers with a 3.0 grade point average in program courses can take an end-of-program assessment and earn a certificate of skill attainment; we refer to those students as Certificate of Skill Attainment (CSA) recipients. Our main analyses in Figures 1–5 focus on all concentrators, including students who go on to complete the pathway or earn a CSA. In a few places — such as the Sankey diagrams in Figures 7–8 and 10–11 — we focus on mutually exclusive groups.

In earlier work, we estimated that 34 percent of Nevada's high school graduates were CTE completers and 16 percent were CSA recipients, with substantial variation across career clusters — completion rates were highest in Arts, Health Science, and Hospitality and lowest in Finance, Business, and Government (Mihaly et al., 2025). Depending on the district, concentrators may also supplement their CTE experience through work-based learning, additional industry-recognized credentials, or college credit. CTE courses also count toward a College and Career Ready (CCR) High School Diploma, and the Nevada State Board of Education has set a goal of 50 percent of students completing a CCR Diploma by 2026 (NDE, 2024). Beyond high school, formal articulation agreements between Nevada's school districts and the four NSHE community

colleges — the College of Southern Nevada, Truckee Meadows Community College, Western Nevada College, and Great Basin College — are designed to create pathways from secondary CTE into aligned postsecondary programs (NDE, 2023).

Nevada's 2024–2028 Perkins V State Plan establishes three strategic goals for CTE: (1) increase access to and achievement in high-quality CTE programs tied to high-skill, high-wage, and high-demand occupations; (2) develop a systematic approach to increase CTE participation and concentration for all students; and (3) build a pipeline of skilled workers for Nevada employers (NDE, 2024). Together, these goals reflect Nevada's vision of a 'connected and integrated' system that smooths students' pathways between high school, postsecondary programs, alternative skills training, and in-demand occupations (NDE, 2024, p. 15). The 2025 Nevada Legislature embedded CTE-specific metrics into the state's school accountability system, including the number of industry credentials earned and the number of graduates enrolling in vocational or technical programs (Sando, 2026).

Nevada Workforce Context

Nevada's workforce needs make CTE alignment an important policy question with real economic consequences. Historically, Nevada's workforce has been heavily concentrated in the service sector. Today, 20 percent of its 1.5 million workers are employed in arts, entertainment, recreation, accommodation, and food services — a reflection of the state's reliance on tourism and gaming. Another 17 percent work in educational services, health care, and social assistance (GOED, 2025). Nevada's unemployment rate is 5.3 percent (LAUS, 2026), and the state's ratio of 1.5 unemployed workers to every available job is one of the highest in the country (BLS, 2026). Even so, the state faces workforce shortages in some high-priority sectors. These shortages stem not from overall labor scarcity but from a mismatch between the workers Nevada has and the workers its economy needs.

Two sectors illustrate this mismatch clearly. First, Nevada is the largest gold-producing state in the U.S. and is rapidly becoming a center of the domestic critical minerals and electric vehicle battery supply chain. Major projects — including the Thacker Pass lithium mine and the Tesla Gigafactory — are driving growing demand for skilled mining and manufacturing technician-level workers. In July 2024, the U.S. Economic Development Administration awarded approximately $21 million to the Nevada Tech Hub, a consortium led by the University of Nevada, Reno, to advance the state's lithium battery and electric vehicle materials economy, with workforce development as a primary focus (EDA, 2024). Second, Nevada faces one of the most severe teacher shortages in the nation: the state had just 44 teachers per 1,000 enrolled students in 2023, the lowest ratio of any state (Scholaroo, 2024). Nevada's teacher shortage is especially acute in rural communities, in special education, and in STEM subjects (U.S. Commission on Civil Rights, 2024; NV Coalition, 2025). These two sectors represent workforce pipelines of

significant economic consequence for the state, making them natural focal points for this analysis of CTE alignment.

Literature

Evidence from the CTE literature indicates that CTE participation, especially at higher intensity levels and in specialized settings, improves high school completion (Brunner et al., 2023; Dougherty, 2018; Dougherty et al., 2019; Gottfried and Plasman, 2018; Hemelt et al., 2019; Kemple, 2008). The picture is more nuanced for college enrollment and completion. CTE participation channels students toward two-year rather than four-year colleges (Cellini, 2006; Ecton and Dougherty, 2023) and studies that do not distinguish by institution type find a small or even negative relationship between CTE and college-going (DeLuca et al., 2006; Gottfried and Plasman, 2018; Plasman, 2026). Studies of career outcomes generally find that CTE is associated with higher earnings and employment rates, but this association is concentrated among male students (Brunner et al., 2023; Ecton and Dougherty, 2023; Hemelt et al., 2019; Kemple, 2008; Plasman, 2026) and those taking upper-level or concentrated CTE courses (Ecton and Dougherty, 2023; Kreisman and Stange, 2020).

Importantly, CTE research increasingly recognizes that CTE is an umbrella of many programs. Ecton & Dougherty (2023) found that the effect of CTE varies by field of study, with earnings gains concentrated among Construction, Transportation, Manufacturing & Technology, and Healthcare. The same study found that postsecondary enrollment was increased among more college-oriented CTE fields (Healthcare, Education) and reduced among more trade-oriented fields (Construction, Transportation). Stevens et al. (2019) document similar heterogeneity across a more coarse measure: they estimate larger returns from healthcare than non-healthcare fields. Using Nevada data, Mihaly et al. (2025) show that college enrollment and employment rates vary substantially across career clusters, and that more intensive CTE participation is associated with higher college enrollment, employment, and earnings. Finally, Plasman (2026) finds that the benefits of CTE concentration are strongest for construction, manufacturing, transportation, and law; in other industries there are small or even negative returns.

The broader literature on education and industry match provides theoretical and empirical evidence that alignment matters. Altonji, Blom, and Meghir (2012) develop a theoretical model linking high school curriculum to major choice and career pipeline. The specificity of human capital and uncertainty about preferences and labor market returns generate mismatch frictions in their framework: if human capital is field-specific, a worker whose job does not match their field of training leaves field-specific skills unused, reducing their productivity and earnings relative to a matched worker. Odle and Russell (2024) add empirical support, constructing a novel crosswalk between college degree field and industry and estimating that matched degree-industry workers earn a 7–11 percent premium.

CTE prepares students for both college and workforce, and one purpose of CTE is to develop a labor force for in-demand jobs. Almost no prior work has directly measured CTE-specific alignment; the most related studies focus on alignment within CTE. Plasman, Gottfried, and Sublett (2019) find that high school CTE predicts same-field college CTE course-taking. Xu and Backes (2024) similarly find that focusing on a CTE field in high school is associated with initially majoring in and ultimately obtaining a postsecondary credential in that field, though most students still end up in fields different from their high school CTE focus. Sultana, Andrews, and Giani (2026) find that credentials not aligned with CTE courses produce earnings losses rather than gains, and Plasman (2026) provides evidence that credentials are most valuable when embedded in a coherent CTE pathway: the strongest wage benefits were for students who completed multiple CTE courses in the same field. At the labor market level, Carruthers et al. (2024) find that CTE is only partially aligned with local labor market demand, reporting that a 10-percentage-point higher share of local jobs in a career cluster is associated with a 3-point higher rate of CTE concentration in that cluster.

No prior work has measured individual-level alignment between high school CTE and both postsecondary major choice and employment simultaneously, especially in a state-specific context with priority workforce sectors. Indeed, a recent comprehensive study of CTE in Washington state identifies such analysis as a priority for future research (Riggs and Cigarroa Kennedy, 2025). Thus, this analysis extends an existing body of work analyzing the effects of CTE course-taking on post-high-school outcomes by looking more specifically at subject overlap.

Appendix B. Data and Sample

Data Sources

We use statewide longitudinal administrative data from the Nevada P-20 to Workforce Research (NPWR) Data System, which links individual-level records across three state agencies. High school records come from the Nevada Department of Education (NDE); postsecondary enrollment and completion records come from the Nevada System of Higher Education (NSHE); and employment and earnings records come from the Nevada Department of Employment, Training, and Rehabilitation (DETR). A common de-identified student identifier links records across the three sources, allowing us to follow each student from high school into Nevada colleges and the Nevada workforce. Because all three sources are limited to Nevada, we observe only in-state postsecondary enrollment at public institutions and in-state, unemployment-insurance-covered employment. Students who enroll in private Nevada colleges or in colleges outside Nevada, or who work in jobs not covered by unemployment insurance (e.g., self-employment, military, some federal and gig work) or in jobs outside Nevada, appear in the data as though they did not enroll or were not employed.

NDE provided demographic characteristics, CTE participation records, and graduation records for the five cohorts of students who first entered ninth grade in a Nevada public school in academic years 2015–16 through 2019–20. This includes detailed information on each student's CTE program(s) of study (six-digit CIP code), career cluster, and highest level of CTE engagement (concentrator, completer, or CSA recipient; defined below), as well as sex, race and ethnicity, school district, and middle school test scores. We use the graduation file only to confirm high school completion, not the specific graduation year, because we define cohorts by ninth-grade entry and measure outcomes relative to when each cohort would graduate on time.

CTE courses are grouped into Programs of Study (POS), which are nested within career clusters.[1] In some cases we report results for these career clusters. Table B.1 reports our shortened labels for these career clusters and their longer descriptions.

[1] We use the federal career clusters that were in place when our sample of students was in high school. Since then, the federal career clusters have been updated.

Table B.1. Career Cluster Abbreviations

Shortened Label	Career Cluster Title
Agriculture	Agriculture, Food, and Natural Resources
Architecture	Architecture and Construction
Arts	Arts, A/V Technology, and Communication
Business	Business Management and Administration
Education	Education and Training
Finance	Finance
Government	Government and Public Administration
Health Science	Health Science
Hospitality	Hospitality and Tourism
Human Services	Human Services
IT	Information Technology
Law	Law, Public Safety, Corrections, and Security
Manufacturing	Manufacturing
Marketing	Marketing
STEM	Science, Technology, Engineering, and Mathematics
Transportation	Transportation, Distribution, and Logistics

SOURCE: Authors' analysis of NPWR data from 2016-2024.
NOTE: This table lists the shortened labels we use for legibility and their associated full career cluster titles. We exclude Government from the by-career-cluster analyses due to the small number of students who are concentrators.

We used NSHE records on enrollment (including whether they enrolled at a two- or four-year public Nevada institution), majors (CIP codes), and degrees for the 2018-2019 to 2024-2025 academic years. We can follow all of our cohorts for at least two years after expected high school graduation.[2] We only focus on records that occur after a student's cohort would have graduated on time, so college credits earned during high school (e.g., dual enrollment) are not counted.[3]

DETR contributes quarterly, unemployment-insurance-covered employment and earnings records for individuals working at Nevada employers. For each student and quarter, we use total wages and the employer's industry — reported as a North American Industry Classification System (NAICS) code and rolled up to three digits — from which we construct an indicator for employment (positive unemployment-insurance-covered wages) and the student's dominant industry (the three-digit NAICS with the highest annual earnings). We base industry alignment

[2] NSHE data cover only Nevada public institutions, so enrollment or degrees earned out of state or at private institutions are not observed.

[3] Nearly all enrolled students have a declared major; the small number without one contribute to enrollment counts but cannot be assessed for major alignment.

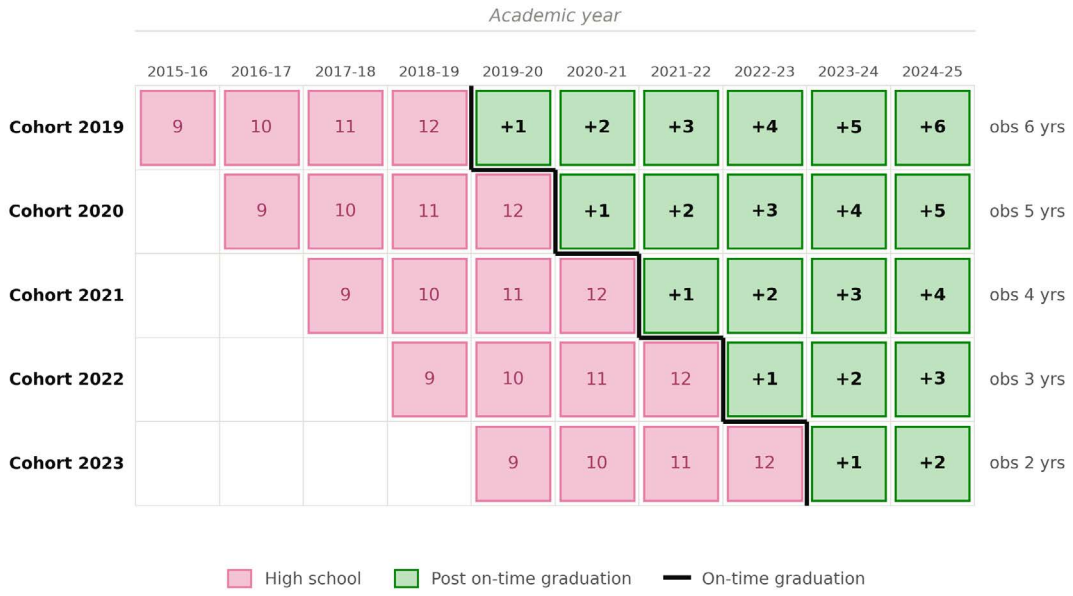
on the three-digit NAICS of the student's employer(s) and focus on workforce outcomes two years after students are expected to complete high school.

Cohort and Sample Construction

Our analytic sample follows five cohorts of students who first entered ninth grade in a Nevada public school in academic years 2015–16 through 2019–20. We define timing relative to each student's on-time high school graduation year (the ninth-grade cohort year plus three) rather than their actual graduation year, so that we compare cohorts at the same number of years past expected graduation. In the report, we refer to cohorts by the year of their on-time graduation, yielding 2019 through 2023 cohorts.

We track postsecondary and workforce outcomes for up to six years after on-time graduation. The length of time we can track students varies by cohort, as we have outcome data through the 2024–25 academic year. We therefore focus primarily on alignment measures two years after high school, which holds the follow-up period constant across cohorts and makes patterns over time more comparable. For credential outcomes, we focus on receipt of a certificate or associate degree within three years of high school. We exclude the final graduating cohort from these analyses because we cannot follow those students for three years. We also do not examine bachelor's degree receipt because we cannot follow most students long enough to observe bachelor's degrees. Figure B.1 depicts the available years of data for each cohort.

Figure B.1. Cohort Definitions and Data Availability



SOURCE: Authors' analysis of NPWR data from academic years 2016-2025.
NOTE: Cohort progression diagram showing on-time grade progression, on-time graduation year, and the number of post-graduation years observed in the NSHE and DETR data for each of the five cohorts.

We restrict the analytic sample to students who concentrated in at least one CTE program of study. Under the federal Perkins V framework, a CTE concentrator has completed at least two courses in a single program of study. In Nevada, this translates to at least 2.0 credits in a single program of study. This restriction yields approximately 66,000 CTE concentrators across the five cohorts.

Because a student can concentrate in more than one CTE program of study, the analytic file is structured at two levels. At the student-by-program level, a student who concentrated in two programs contributes one record per program. At the student-by-cluster level, records for a student who concentrated in multiple programs within the same career cluster are collapsed into a single cluster record, with CTE engagement and alignment measured as the highest level attained within that cluster. Students who concentrate in programs of study across multiple clusters will contribute one record per cluster. Demographic characteristics are measured once per student at either level.

Table B.2 reports summary statistics for the analytic sample, shown separately for all Nevada high school graduates and for each of three nested levels of CTE engagement:

- *Concentrators* completed at least two courses in a single CTE program of study.
- *Completers* finished the full course sequence for a program of study (typically two or three years).

- *Certificate of Skill Attainment (CSA) Recipients* are completers who earned at least a 3.0 GPA in their program courses and passed the end-of-program assessment, earning a Certificate of Skill Attainment.

Because these levels are nested, each completer is also a concentrator, and each CSA recipient is also a completer.

Table B.2. Summary Statistics

	High School Grads	CTE Concentrators	CTE Completers	CTE CSA Recipients
Male	49%	52%	51%	47%
Female	51%	48%	49%	53%
Hispanic	42%	43%	44%	36%
White	33%	33%	33%	40%
Black	10%	8%	7%	5%
Asian	7%	8%	9%	12%
Multiracial	6%	5%	5%	6%
Pacific Islander	2%	1%	1%	1%
American Indian/Alaskan Native	1%	1%	1%	1%
Rural	10%	13%	11%	10%
Urban	90%	87%	89%	90%
Free or reduced-price lunch	73%	74%	75%	67%
Pre-grade 9 Assessment Score (SDs)	0.14	0.23	0.29	0.69
Cohort 2019	20%	18%	16%	19%
Cohort 2020	20%	20%	19%	20%
Cohort 2021	20%	21%	21%	21%
Cohort 2022	20%	23%	24%	18%
Cohort 2023	20%	18%	20%	22%
Observations	154,324	66,257	48,322	22,666

SOURCE: Authors' analysis of NPWR data from 2016-2024.
NOTE: Each cell reports the share of students with the indicated characteristic, separately by group (as denoted by the columns). The sample includes NDE secondary students who were expected to graduate high school between 2019 and 2023. Cohorts refer to the expected year of high school graduation. CTE Concentrators concentrated in at least one CTE program of study. CTE Completers completed one or more CTE programs of study. CTE CSA Recipients completed one or more CTE programs of study and earned one or more Certificates of Skill Attainment. Cohorts are defined by the year in which a student would have graduated on time from high school based on when they entered ninth grade.

Because each alignment outcome depends on whether a student appears in the relevant data source, the sample available for each analysis differs. Across all outcomes we include only students who graduated from high school within the years of available data. College major alignment is measured among concentrators who enrolled in NSHE and declared a major within two years of high school. Credential alignment is measured among concentrators who completed a certificate or associate degree within three years of high school graduation. Industry alignment

is measured among concentrators who were employed in Nevada within two years of high school graduation[4]. Table B.3 documents these denominators, reporting the share of students in each cohort who appear in each source.

Table B.3. CTE Concentrators Observed in Postsecondary Education and Nevada Employment Data, by Cohort

Cohort	N	Enrolled in NSHE in 2 years	Completed Certificate or AA In 3 years	Employed in NV in 2 years
2019	11,909	50.9%	6.6%	60.1%
2020	13,384	46.0%	6.4%	53.4%
2021	13,963	45.4%	5.7%	49.2%
2022	15,010	45.5%	6.0%	44.4%
2023	11,991	51.2%		46.0%
Overall	66,257	47.6%	6.2%	50.3%

SOURCE: Authors' analysis of NPWR data from 2016-2025.
NOTE: Table reports data-source match rates: the count and share of CTE concentrators in each cohort who enrolled in NSHE (2 years after on-time graduation), completed a college certificate or Associate Degree (AA) within 3 years, or were employed in Nevada (2 years after on-time graduation). The 2023 cohort only has 2 years of post-HS NSHE data; hence the 3-year credential sample is left blank.

The samples for the Sankey diagrams differ slightly. For these analyses, we map students from a CTE program of study to a single destination in college or the workforce, so we focus on college enrollment outcomes in year two (rather than within two years).

[4] The four-quarter window focuses on employment after the immediate post-graduation period rather than transitional summer work.

Appendix C. Measuring Alignment

A key feature of this analysis is examining the extent to which CTE participation is 'aligned' with postsecondary and workforce outcomes. In this appendix we describe the alignment measures used in the report. Conceptually, we want to understand the extent to which CTE course-takers continue their education or find employment in a field connected to their high school CTE courses. NDE maps each CTE program of study to a career cluster, which we use as the basis for matching to postsecondary fields of study. NDE also links each CTE program of study to a six-digit CIP code, which designates the program's instructional area. We use this six-digit CIP code as the basis for matching to workforce fields.

Alignment with Postsecondary

We define postsecondary alignment as the student pursuing a college major or degree in an instructional area within the same career cluster as their high school CTE program. To do so, we need a categorization of college fields of study into career clusters. Advance CTE provides a crosswalk mapping college major CIP codes to their National Career Clusters Framework (2024). However, that framework organizes programs into a newer set of 14 clusters, whereas our sample is from when Nevada organized its CTE courses under Advance CTE's original framework based on 16 clusters. We bridge this gap using Advance CTE's own suggested mapping from the original 16 clusters to the 14 newer ones, then connect those clusters to college major CIP codes. This conversion introduces some ambiguity: three of the 14 new clusters are designated as 'cross-cutting,' meaning they span multiple occupational domains rather than representing a single discrete field. Table C.1 presents the full crosswalk between Nevada's career clusters and the corresponding new Advance CTE cluster; the table also lists the number of aligned majors and example aligned majors for each career cluster. Majors may align with more than one cluster.

An alternative approach would be to map each high school program of study (defined by its 6-digit CIP code) directly to an Advance CTE sub-cluster (a finer division within each career cluster). Advance CTE recommends that states should develop these mappings themselves, but Nevada has not yet completed this task. Rather than making subjective decisions about program-to-sub-cluster mappings, we use the existing career cluster crosswalk provided by Advance CTE.

Table C.1. Advance CTE Crosswalk for Postsecondary Alignment

NDE Career Cluster	Advance CTE Career Cluster	# of Aligned Majors	% of Total Majors (N = 2,142)	Example Aligned College Majors/Degrees
Agriculture, Food, and Natural Resources	Agriculture	173	8%	Food Science, Veterinary Medicine, Genetics
Architecture & Construction	Construction	101	5%	Architecture, Urban Planning, Masonry
Arts, A/V Technology, & Communications	Arts, Entertainment, & Design	149	7%	Graphic Design, Interior Design, Broadcast Journalism
Business Management & Administration	Management & Entrepreneurship	249	12%	Business, Insurance, Human Resources Management
Education & Training	Education	1332	62%	Early Child Program Administration, Nursing Education, Social Sciences
Finance	Financial Services	66	3%	Real Estate, Accounting, Banking and Financial Support Services
Government & Public Administration	Public Service & Safety	249	12%	Law, Fire Protection, Security and Loss Prevention
Law, Public Safety, Corrections & Security				
Health Science	Healthcare & Human Services	766	36%	Child Development, Social Work, Nursing
Human Services				
Hospitality & Tourism	Hospitality, Events, & Tourism	60	3%	Public Relations, Culinary Arts, Casino Operations
Information Technology	Digital Technology	89	4%	Computer Science, Information Technology, Data Science
Manufacturing	Advanced Manufacturing	214	10%	Engineering, Machine Tool Technology, Drafting and Design
STEM				
Marketing	Marketing & Sales	54	3%	Public Relations, Advertising, Customer Service Support
Transportation, Distribution, & Logistics	Supply Chain & Transportation	70	3%	Office and Clerical Services, Construction, Public Administration

We also considered another measure of alignment based on 4-digit CIP codes: a college major is counted as aligned if it shares a 4-digit CIP stem with the student's high school program of study. While this measure captured many of the same matches as the Advance CTE cluster

approach, it excluded others that we preferred to categorize as aligned. For example, under the alternative measure of alignment, the Culinary Arts program of study (CIP code 12.0503) would not be aligned with Restaurant/Food Services Management (CIP code 52.0905) or Foods, Nutrition, and Wellness Studies (CIP code 19.0501). The Advance CTE crosswalk that we use in the report allows for what we consider a more generous interpretation of alignment. However, this expansive definition includes majors that may not be as directly related to high school CTE course-taking. For example, NDE's Education career cluster matches with most liberal arts majors; while there are likely overlapping skills between Education CTE courses and these majors, most students pursuing liberal arts majors will not become educators, counselors, or administrators. Instead, the 4-digit CIP stem maps to only the 14 CIP codes in the Education group, which includes majors like early childhood education, teaching, educational administration, and school psychology.

As seen in Table C.1, there is significant variation across clusters in the number of aligned majors. Of the more than 2,100 CIP codes, Advance CTE designates over half as aligned to NDE's Education career cluster. On the other hand, Marketing aligns with only 3 percent of majors. Therefore, comparing alignment across clusters in our analyses should be done with care; higher levels of alignment in Education may indicate more possibilities for aligned majors rather than a particularly strong attachment to the career cluster. This is one of the reasons we also analyze alignment at the program of study level in the report.

Alignment with Workforce

To measure alignment between CTE career cluster and industry of employment, we use a crosswalk built by Odle and Russell (2024) linking six-digit 2020 CIP codes for programs of study to three-digit North American Industry Classification System (NAICS) codes. The linkage proceeds in two steps. First, we connect CTE programs of study to occupations using a Bureau of Labor Statistics (BLS) and National Center for Education Statistics (NCES) crosswalk that maps 2020 CIP codes to 2018 Standard Occupational Classification (SOC) codes; on average, each CIP code maps to three SOC codes. Second, we match SOC codes to NAICS codes using the BLS Occupation-Industry Matrix. Odle and Russell (2024) define a link between an SOC code and a NAICS code when at least 10 percent of workers in that occupation are employed in a given three-digit NAICS industry; on average, each occupation maps to four industries. This threshold excludes weak CIP-to-NAICS matches while retaining industries that meaningfully employ workers from a given field. The resulting crosswalk provides an alignment indicator between a student's six-digit CIP code and their three-digit NAICS industry of employment. NAICS codes may align with more than one CIP code.

Table C.2. Odle & Russell (2024) Crosswalk for Industry Alignment

NDE Career Cluster	# of Aligned Industries	Example Aligned Industries
Agriculture, Food, and Natural Resources	19	Crop Production, Food and Beverage Retailers, Animal Production & Aquaculture
Architecture & Construction	10	Wood Product Manufacturing, Machinery Manufacturing, Specialty Trade Contractors
Arts, A/V Technology, & Communications	9	Broadcasting and Content Providers, Performing Arts, Motion Picture and Sound Recording Industries
Business Management & Administration	15	Professional, Scientific, and Technical Services, Management of Companies and Enterprises, Personal and Laundry Services
Education & Training	3	Educational Services, Social Assistance, Religious, Grantmaking, Civic, Professional, and Similar Organizations
Finance	7	Insurance Carriers and Related Activities, Monetary Authorities, Educational Services
Health Science	7	Hospitals, Health and Personal Care Retailers, Nursing and Residential Care Facilities
Hospitality & Tourism	6	Food Services and Drinking Places, Accommodation, Amusement, Gambling, and Recreation Industries
Human Services	6	Hospitals, Nursing and Residential Care Facilities, Personal and Laundry Services
Information Technology	6	Telecommunications, Publishing Industries, Computer and Electronic Product Manufacturing
Law, Public Safety, Corrections & Security	3	Administrative and Support Services, Professional, Scientific, and Technical Services, Educational Services
Manufacturing	15	Primary Metal Manufacturing, Heavy and Civil Engineering Construction, Utilities
Marketing	4	Management of Companies and Enterprises, Professional, Scientific, and Technical Services, Educational Services
STEM	10	Merchant Wholesalers, Professional, Scientific, and Technical Services, Religious, Grantmaking, Civic, Professional, and Similar Organizations
Transportation, Distribution, & Logistics	14	Rail Transportation, Motor Vehicle and Parts Dealers, Air Transportation

SOURCE: Author adaptation of Odle & Russell (2024) Crosswalk.

Appendix D. Analysis Methodology

Methods

To examine the relationship between CTE participation and postsecondary or industry alignment, we calculated descriptive statistics using linked K–12, higher education, and workforce data for five cohorts of Nevada CTE students with expected on-time graduation between 2019 and 2023. We grouped students by their level of CTE participation (concentrators only, completers, and CSA recipients; see Appendix B for definitions).

We calculated the share of students meeting a given outcome (alignment measure) as a simple proportion, reported separately by CTE engagement level, cohort, and program of study, as well as by sex and school district geography (urban or rural). As described in Appendix C, we defined college major alignment as declaring a postsecondary major whose six-digit CIP code maps to the student's specific CTE career cluster; we defined industry alignment as ever having held a job in an industry whose three-digit NAICS code maps to the student's six-digit CIP code. When the outcome is college major alignment, we restricted the sample to students who enrolled in any postsecondary institution and declared a major within two years of high school. The credential alignment analysis is restricted to students who earned a certificate or associate degree within three years of high school graduation. For the industry alignment outcome, we restricted the sample to students who were employed in Nevada within two years after high school (unless otherwise noted).

We dropped the small share of students enrolled in college who had no information on a major or program of study (4 percent of the college sample). We also dropped the 0.17 percent of students who were employed in Nevada within two years of high school but had no valid NAICS codes for any employment spells.

We restricted program-level analyses of both college and workforce alignment to programs of study with at least 50 students in the relevant group, pooling all five cohorts. The one exception is the Welding analysis, where we restricted the sample to at least 20 students. Sankey diagrams illustrating flows from CTE program to college major or industry are measured at two years after high school. We also carried out two subgroup analyses, splitting the sample by sex (male or female) and urbanicity of school district (urban or rural) and calculating the share of aligned students within each group.

We also carried out descriptive regression analyses (see Appendix E for results) to explore how alignment rates vary with CTE engagement, conditional on student characteristics. First, we estimated student-level linear probability models following Equation (1).

$$Y_{icp} = \beta_0 + \beta_1 COMP_i + \beta_1 CSA_i + X_i'\beta + \gamma_c + \varepsilon_{icp} \quad (1)$$

In these regressions, Y_{icp} is an indicator for whether the college major or industry of student i in cohort c is aligned with their CTE program of study p, $COMP_i$ is an indicator for whether student i is a Completer, CSA_i is an indicator for whether student i is a CSA Recipient, X_i' is a vector of observable student characteristics, and γ_c is the cohort fixed effects. Student characteristics include sex, race, ethnicity, an indicator for participating in Free and Reduced-Price Lunch, middle school test scores, and urbanicity of the school district.

We also estimate specifications according to Equation (2)

$$Y_{icp} = \beta_0 + X_i'\beta + \gamma_c + \tau_p + \varepsilon_{icp} \quad (2)$$

These models are similar to Equation (1) but instead of indicators for Completer and CSA Recipient they include career cluster fixed effect, τ_p. Career cluster fixed effects are estimated relative to mean effects following Mihaly et al. (2010). We estimate these equations separately for students who are concentrators, completers, and CSA recipients. A student may appear multiple times in a regression if they participate in multiple CTE programs.

Because the analysis is purely descriptive, observed differences across CTE engagement levels, cohorts, student characteristics, or programs reflect associations in the data and should not be interpreted as causal effects.

Appendix E. Supplementary Results

CTE Intensity and Alignment Supplementary Results

Table E.1. Linear Probability of College and Workforce Alignment by CTE Engagement

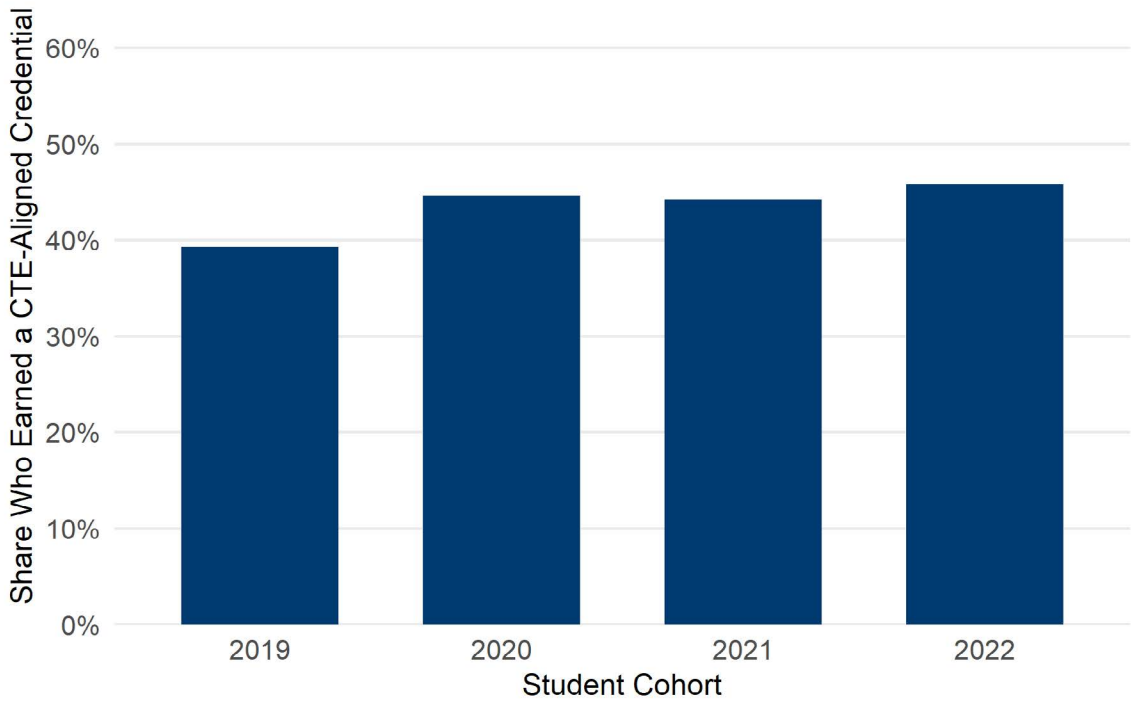
	College Major Alignment	College Credential Alignment	Industry Alignment
Completer	0.077***	0.092***	0.044***
	(0.008)	(0.023)	(0.006)
CSA Recipient	0.217***	0.300***	0.058***
	(0.007)	(0.021)	(0.006)
Female	0.053***	0.065***	0.047***
	(0.006)	(0.017)	(0.005)
Asian	0.052***	0.035	-0.015
	(0.010)	(0.033)	(0.010)
Black	0.024	0.061	0.039***
	(0.012)	(0.048)	(0.010)
Hispanic	0.01	0.007	-0.014
	(0.007)	(0.020)	(0.006)
American Indian/Alaskan Native	-0.032	-0.14	-0.035
	(0.036)	(0.081)	(0.029)
Multiracial	0.009	0.022	-0.001
	(0.013)	(0.041)	(0.011)
Pacific Islander	0.024	-0.099	-0.009
	(0.026)	(0.091)	(0.022)
Free and Reduced Price Lunch	-0.009	0.007	0.017**
	(0.007)	(0.019)	(0.006)
9th Grade Test Score	0.031***	0.019	-0.020***
	(0.004)	(0.013)	(0.003)
Rural	-0.097***	-0.069***	0.015
	(0.009)	(0.020)	(0.007)
2020 Graduating Cohort	0.033***	0.049	-0.001
	(0.009)	(0.023)	(0.007)
2021 Graduating Cohort	0.036***	0.048	-0.009
	(0.009)	(0.024)	(0.007)
2022 Graduating Cohort	0.065***	0.072**	-0.015
	(0.009)	(0.024)	(0.008)
2023 Graduating Cohort	0.079***	--	-0.029***
	(0.009)		(0.008)

	College Major Alignment	College Credential Alignment	Industry Alignment
Constant	0.241***	0.179***	0.135***
	(0.010)	(0.028)	(0.008)
Observations	30,186	3,290	27,306

SOURCE: Authors' analysis of NPWR data from 2016-2025.
NOTE: CTE groups are defined as mutually exclusive here. CTE Concentrators completed 2 or more courses in a CTE program of study but did not complete the program. CTE Completers finished a full CTE program sequence without obtaining a Certificate of Skill Attainment. CSA Recipients earned a Certificate of Skill Attainment. Alignment is defined as declaring a college major with a CIP code that maps to the student's CTE career cluster, a college credential (Certificate or AA) with a CIP code that maps to the student's CTE career cluster, or working in an industry measured by NAICS sector. College majors and industry alignment are assessed within two years of high school, and credential attainment is based on earning them within three years of high school. CTE intensity indicators are relative to Concentrators. Cohort variables are relative to the 2019 cohort. Race variables are relative to White students. Indicators for missingness included for student demographics. Standard errors clustered at the school level in parentheses. * p<0.05, ** p<0.01, *** p<0.001.

College Credential Supplementary Results

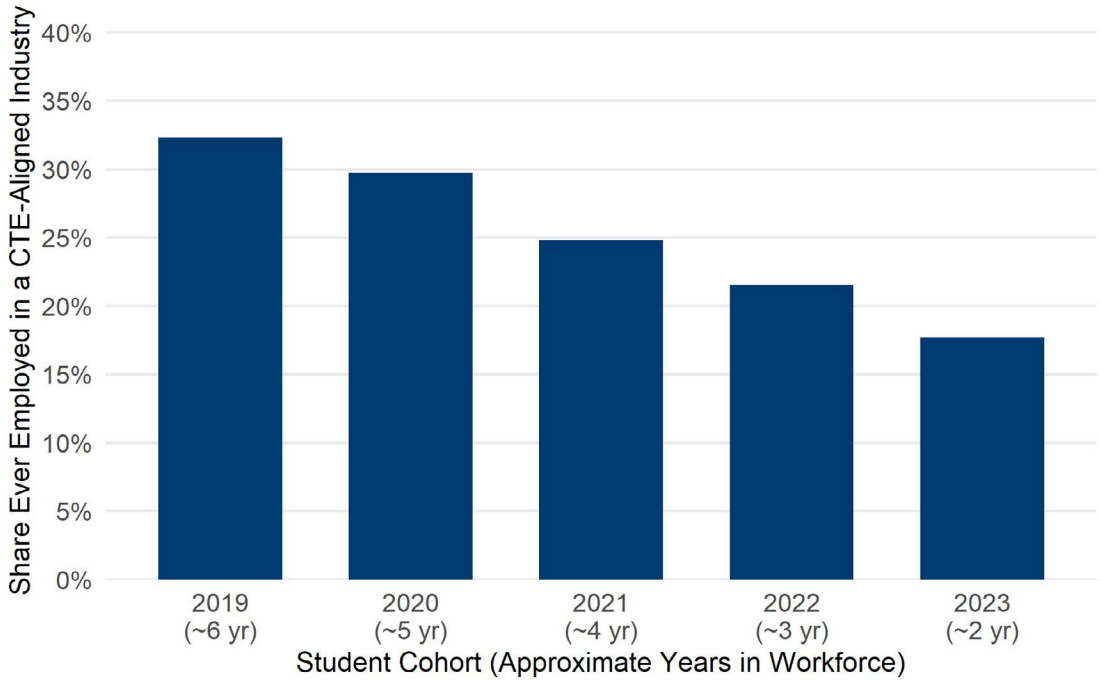
Figure E.1. Alignment of College Credentials among CTE Students Who Earned a College Credential within 3 Years, by Student Cohort



SOURCE: Authors' analysis of NPWR data from 2016-2025.
NOTE: This sample is restricted to CTE concentrators who enrolled in NSHE and earned a certificate (2 years or less) or associate's degree as their highest credential within 3 years of on-time high school graduation. Credential alignment is defined as earning that credential in a CTE-aligned CIP field. The y-axis shows, among the students who earn a credential. the share who have a credential in an aligned field. The 2023 cohort is excluded because they cannot be followed in NPWR for three years. Cohorts are defined by expected high school graduation year (2019–2022).

Workforce Alignment Supplementary Results

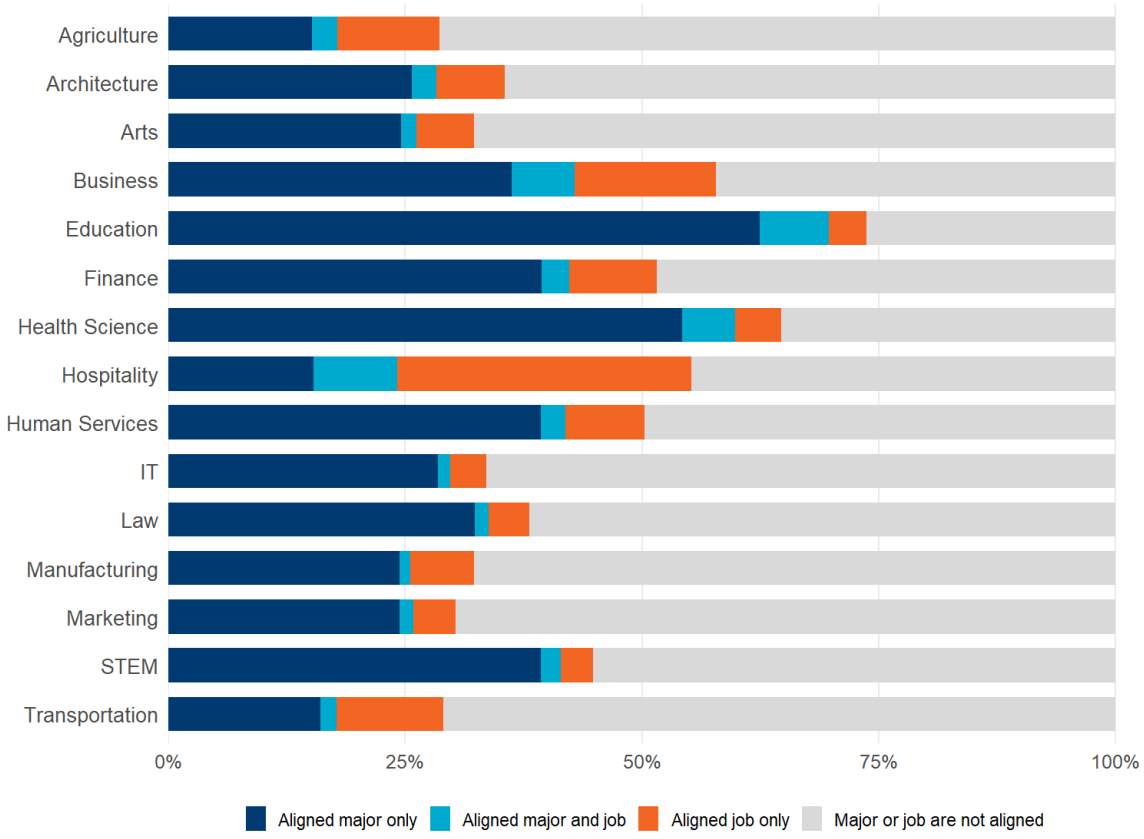
Figure E.2. Share of CTE Students Ever Employed in a CTE-Aligned Industry, by Years Observed in Workforce



SOURCE: Authors' analysis of NPWR data from 2016-2025.
NOTE: Sample includes CTE concentrators who were employed in Nevada after expected high school graduation. CTE Concentrators completed 2+ courses in a CTE program of study. Rates are cumulative (ever employed in an aligned industry through the observation window for each cohort). Approximate years in workforce reflects the number of years of DETR data available for each cohort. Cohorts are defined by expected high school graduation year (2019–2023).

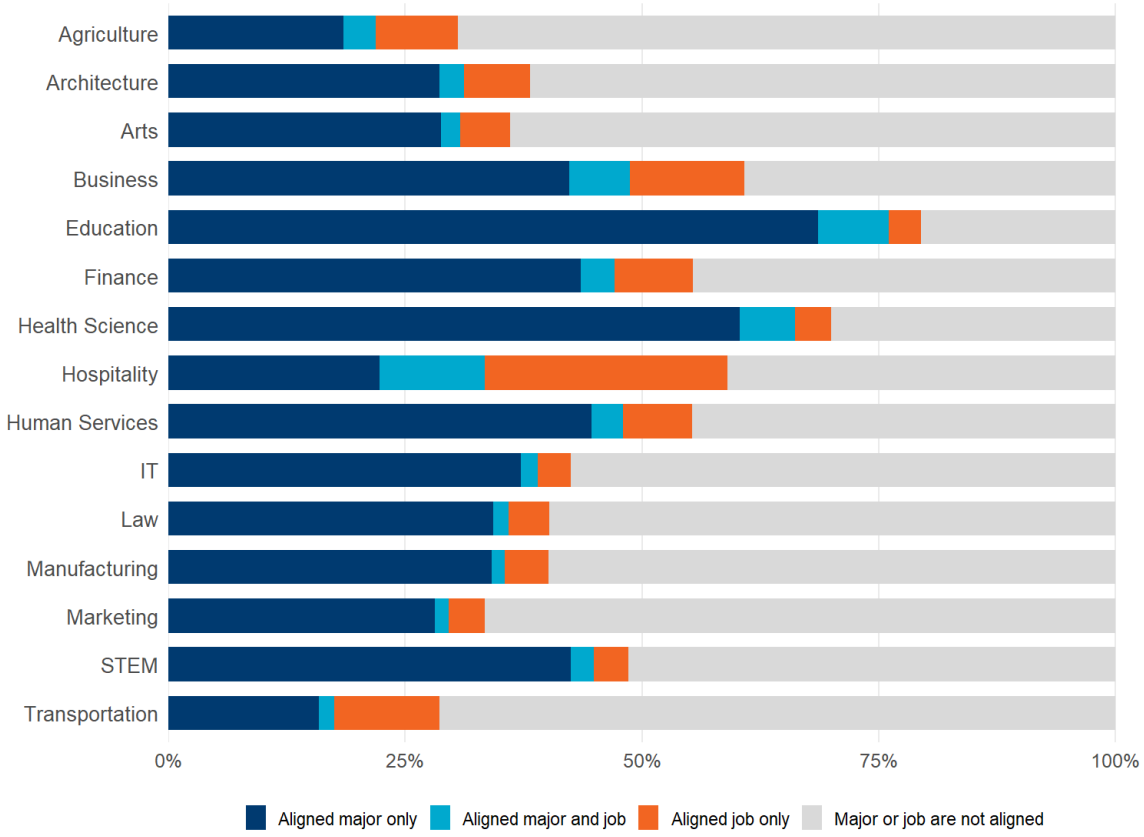
Alignment by Career Cluster Supplementary Results

Figure E.3. Share of CTE Completers Ever Aligned with Their CTE Field Through College, Work, or Both, by Career Cluster



SOURCE: Authors' analysis of NPWR data from 2016-2025.
NOTE: Sample includes all CTE completers within 2 years of on-time high school graduation who were enrolled in a Nevada public college or working in a job covered by Nevada's unemployment insurance system. CTE Completers completed a full program of study. Students who are not enrolled in college or working in Nevada are excluded from this figure. Aligned Major Only: declared a college major aligned with their CTE field but not employed in an aligned industry. Aligned Major and Job: both declared an aligned major and were employed in an aligned industry. Aligned Job Only: employed in an aligned industry but did not declare an aligned major. Neither: Enrolled in college or working but in a field that is not aligned with program of study.

Figure E.4. Share of CSA Recipients Ever Aligned with Their CTE Field Through College, Work, or Both, by Career Cluster



SOURCE: Authors' analysis of NPWR data from 2016-2025.
NOTE: Sample includes all CSA recipients who were enrolled in a Nevada public college or working in a job covered by Nevada's unemployment insurance system within 2 years of on-time high school graduation. Students who are not enrolled in college or working in Nevada are excluded from this figure. Aligned Major Only: declared a college major aligned with their CTE field but not employed in an aligned industry. Aligned Major and Job: both declared an aligned major and were employed in an aligned industry. Aligned Job Only: employed in an aligned industry but did not declare an aligned major. Neither: Enrolled in college or working but in a field that is not aligned with program of study.

Regression Results

College Major Alignment

Table E.2 reports results from regressions of major alignment on student characteristics, cohort, and program of study. The estimates are broadly consistent with the descriptive patterns reported in the main report. The large positive coefficients on Education and Training and Health Science and the large negative coefficients on Agriculture, Food, and Natural Resources; Hospitality and Tourism; and Transportation confirm that alignment varies widely across career clusters, a pattern visible in Figure 3 of the main report. The regressions also confirm a substantial urban advantage: students in rural school districts were approximately 9 to 12

percentage points less likely to declare an aligned major than their urban peers, depending on engagement level and holding other factors constant.

Sex was not significantly associated with major alignment at any engagement level once we conditioned on career cluster. However, alignment rates varied by sex within career clusters. Most differences by race/ethnicity or Free or Reduced-Price Lunch status were not statistically significant once we conditioned on other demographics and career clusters.

Table E.2. Correlations with Major Alignment by CTE Engagement

	Concentrator	Completer	CSA Recipient
Female	-0.004	0.002	0.014
	(0.005)	*(0.006)*	*(0.008)*
Asian	0.062	-0.003	0.066
	(0.033)	*(0.028)*	*(0.057)*
Black	0.038	-0.026	0.042
	(0.034)	*(0.030)*	*(0.059)*
White	0.033	-0.037	0.034
	(0.033)	*(0.028)*	*(0.056)*
Hispanic	0.034	-0.036	0.047
	(0.033)	*(0.028)*	*(0.056)*
American Indian/Alaska Native	-	-0.093	-
	-	*(0.048)*	-
Multiracial	0.049	-0.018	0.039
	(0.034)	*(0.030)*	*(0.058)*
Pacific Islander	0.056	-	0.049
	(0.039)	-	*(0.067)*
Free and Reduced-Price Lunch	-0.01	-0.006	0.003
	(0.006)	*(0.007)*	*(0.01)*
9th Grade Test Score	0.040***	0.043***	0.023***
	(0.003)	*(0.004)*	*(0.006)*
Rural School District	-0.116***	-0.092***	-0.088***
	(0.008)	*(0.011)*	*(0.015)*
Cohort 2019	0.349***	0.435***	0.394***
	(0.033)	*(0.029)*	*(0.057)*
Cohort 2020	0.370***	0.459***	0.420***
	(0.033)	*(0.029)*	*(0.057)*

	Concentrator	Completer	CSA Recipient
Cohort 2021	0.363***	0.446***	0.396***
	(0.033)	*(0.029)*	*(0.057)*
Cohort 2022	0.372***	0.453***	0.416***
	(0.033)	*(0.029)*	*(0.058)*
Cohort 2023	0.393***	0.471***	0.426***
	(0.033)	*(0.029)*	*(0.057)*
Agriculture	-0.158***	-0.137***	-0.134***
	(0.015)	*(0.018)*	*(0.025)*
Architecture	-0.051***	-0.062***	-0.081***
	(0.011)	*(0.013)*	*(0.016)*
Arts	-0.102***	-0.104***	-0.108***
	(0.006)	*(0.007)*	*(0.01)*
Business	0.064***	0.082***	0.094***
	(0.015)	*(0.018)*	*(0.022)*
Education	0.509***	0.492***	0.462***
	(0.012)	*(0.014)*	*(0.018)*
Finance	0.039	0.063	0.079*
	(0.02)	*(0.026)*	*(0.035)*
Government	-0.095***	-0.11***	-0.142***
	(0.016)	*(0.02)*	*(0.032)*
Health Science	0.2***	0.245***	0.258***
	(0.006)	*(0.007)*	*(0.01)*
Hospitality	-0.119***	-0.112***	-0.085***
	(0.008)	*(0.009)*	*(0.013)*
Human Services	0.093***	0.1***	0.105***
	(0.013)	*(0.016)*	*(0.021)*
IT	-0.099***	-0.099***	-0.042**
	(0.008)	*(0.009)*	*(0.013)*
Law	-0.012	-0.031*	-0.06***
	(0.01)	*(0.012)*	*(0.015)*
Manufacturing	-0.073***	-0.089***	-0.037
	(0.012)	*(0.015)*	*(0.022)*
Marketing	-0.109***	-0.111***	-0.123***
	(0.01)	*(0.013)*	*(0.017)*

	Concentrator	Completer	CSA Recipient
STEM	0.047***	0.024	0.033*
	(0.012)	*(0.013)*	*(0.016)*
Transportation	-0.132***	-0.152***	-0.218***
	(0.013)	*(0.016)*	*(0.023)*
Observations	**36,449**	**26,710**	**15,284**

SOURCE: Authors' analysis of NPWR data from 2016-2025.
NOTE: Regression is at the student-by-cluster level, and the CTE intensity indicators are the student's highest CTE intensity within cluster. Outcome is declaring a major in an aligned field, conditional on declaring a major in the first 2 years after projected on-time high school graduation. Indicators for missingness are included for student demographics. * p<.05, ** p<.01, ***p<.001

Labor Market Alignment

Table E.3 reports regressions of industry alignment on student characteristics, cohort, and career cluster. Similar to the postsecondary alignment analysis, the regression estimates are broadly consistent with the descriptives presented in the main report. The career clusters again show strong associations with industry alignment, but the pattern across clusters differs substantially from the college major alignment results. Consistent with Figure 3, the largest positive coefficients are those for Hospitality and Tourism and Business Management and Administration. Education and Training, which had the strongest association with major alignment, shows no significant association with industry alignment.

Two demographic findings differ from the postsecondary alignment results. First, female students were significantly more likely to work in an aligned industry for Concentrators and Completers (approximately 3 percentage points), in contrast to postsecondary alignment, where male and female students showed no significant differences. Second, there was no urban advantage in industry alignment.

Table E.3. Correlations with Industry Alignment by CTE Engagement

	Concentrator	Completer	CSA Recipient
Female	0.025***	0.027***	0.013
	(0.004)	*(0.005)*	*(0.008)*
Asian	0.019	0.004	-0.013
	(0.025)	*(0.024)*	*(0.035)*
Black	0.042	0.026	0.026
	(0.025)	*(0.024)*	*(0.036)*
White	0.035	0.02	-0.000
	(0.024)	*(0.023)*	*(0.033)*

	Concentrator	Completer	CSA Recipient
Hispanic	0.016	0.002	-0.01
	(0.024)	*(0.023)*	*(0.033)*
American Indian/Alaskan Native	-	-0.019	-0.046
	-	*(0.038)*	*(0.056)*
Multiracial	0.021	0.011	-0.017
	(0.026)	*(0.025)*	*(0.036)*
Pacific Islander	0.008	-	-
	(0.03)	*-*	*-*
Free and Reduced-Price Lunch	0	-0.004	-0.001
	(0.005)	*(0.006)*	*(0.008)*
9th Grade Test Score	0.002	0	0.002
	(0.003)	*(0.003)*	*(0.006)*
Rural School District	-0.006	0.004	-0.000
	(0.006)	*(0.008)*	*(0.012)*
Cohort 2019	0.120***	0.147***	0.176***
	(0.025)	*(0.024)*	*(0.034)*
Cohort 2020	0.117***	0.144***	0.170***
	(0.025)	*(0.024)*	*(0.034)*
Cohort 2021	0.119***	0.143***	0.166***
	(0.025)	*(0.024)*	*(0.035)*
Cohort 2022	0.116***	0.137***	0.158***
	(0.025)	*(0.024)*	*(0.035)*
Cohort 2023	0.115***	0.139***	0.167***
	(0.025)	*(0.024)*	*(0.035)*
Agriculture	0.024*	-0.002	-0.01
	(0.011)	*(0.013)*	*(0.019)*
Architecture	-0.021*	-0.013	-0.012
	(0.008)	*(0.01)*	*(0.014)*
Arts	-0.05***	-0.055***	-0.054***
	(0.005)	*(0.005)*	*(0.005)*
Business	0.185***	0.18***	0.167***
	(0.012)	*(0.005)*	*(0.005)*
Education	-0.019*	-0.021	-0.022
	(0.009)	*(0.011)*	*(0.015)*

	Concentrator	Completer	CSA Recipient
Finance	0.051**	0.059*	0.077*
	(0.018)	*(0.025)*	*(0.035)*
Government	-0.154***	-0.162***	-0.168***
	(0.013)	*(0.005)*	*(0.005)*
Health Science	-0.026***	-0.015	-0.017*
	(0.005)	*(0.006)*	*(0.009)*
Hospitality	0.366***	0.389***	0.428***
	(0.006)	*(0.005)*	*(0.005)*
Human Services	-0.043***	-0.033**	-0.035*
	(0.01)	*(0.013)*	*(0.017)*
IT	-0.072***	-0.072***	-0.067***
	(0.007)	*(0.005)*	*(0.005)*
Law	-0.067***	-0.08***	-0.081***
	(0.008)	*(0.005)*	*(0.005)*
Manufacturing	-0.054***	-0.052***	-0.079***
	(0.009)	*(0.005)*	*(0.005)*
Marketing	-0.068***	-0.074***	-0.079***
	(0.008)	*(0.005)*	*(0.005)*
STEM	-0.065***	-0.068***	-0.064***
	(0.01)	*(0.005)*	*(0.005)*
Transportation	0.012	0.02	0.017
	(0.009)	*(0.012)*	*(0.018)*
Observations	**32,551**	**22,446**	**11,031**

SOURCE: Authors' analysis of NPWR data from 2016-2025.
NOTE: Regression is at the student-by-cluster level, and the CTE intensity indicators are the student's highest CTE intensity within cluster. Outcome is working in an aligned industry, conditional on working in an industry with a NAICS code while not enrolled in college in that quarter in the first 2 years after projected on-time high school graduation. Indicators for missingness are included for student demographics. * p<.05, ** p<.01, ***p<.001

College Major or Industry Alignment

Table E.4 reports results from regressions of alignment in major *or* in industry on student characteristics, urbanicity, cohort, and cluster. Like Tables E.2 and E.3, results are broadly consistent with descriptive results in the report. Students pursuing pathways in Business Management and Administration, Education and Training, Health Science, and Hospitality and Tourism are most likely to pursue aligned postsecondary education or work; these are also the pathways with the strongest relationships with alignment for students who only declare a major (Table E.2) and students who only work (Table E.3).

There is a large urban district advantage; students who concentrate in an urban district were 9 percentage points more likely to pursue aligned postsecondary education or work than their rural counterparts. For concentrators and completers, female students, Asian students, and students who were not eligible for Free or Reduced-Price Lunch were more likely to pursue aligned post-high-school pathways.

Table E.4. Correlations with Major or Industry Alignment by CTE Engagement

	Concentrator	Completer	CSA Recipient
Female	0.014**	0.018**	0.014
	(0.005)	*(0.006)*	*(0.008)*
Asian	0.023	0.087*	0.013
	(0.021)	*(0.037)*	*(0.035)*
Black	-0.006	0.058	-0.008
	(0.022)	*(0.038)*	*(0.038)*
White	-0.018	0.04	-0.032
	(0.021)	*(0.037)*	*(0.035)*
Hispanic	-0.014	0.048	-0.003
	(0.020)	*(0.037)*	*(0.034)*
American Indian/Alaskan Native	-0.044	-	-0.036
	(0.035)	*-*	*(0.064)*
Multiracial	-0.010	0.053	-0.029
	(0.022)	*(0.038)*	*(0.037)*
Pacific Islander	-	0.074	-
	-	*(0.044)*	*-*
Free and Reduced-Price Lunch	-0.021***	-0.022**	-0.005
	(0.006)	*(0.007)*	*(0.009)*
9th Grade Test Score	0.040***	0.039***	0.020***
	(0.003)	*(0.004)*	*(0.006)*
Rural School District	-0.091***	-0.069***	-0.074***
	(0.007)	*(0.01)*	*(0.014)*
Cohort 2019	0.387***	0.350***	0.458***
	(0.021)	*(0.037)*	*(0.036)*
Cohort 2020	0.400***	0.364***	0.471***
	(0.021)	*(0.037)*	*(0.036)*
Cohort 2021	0.409***	0.366***	0.459***

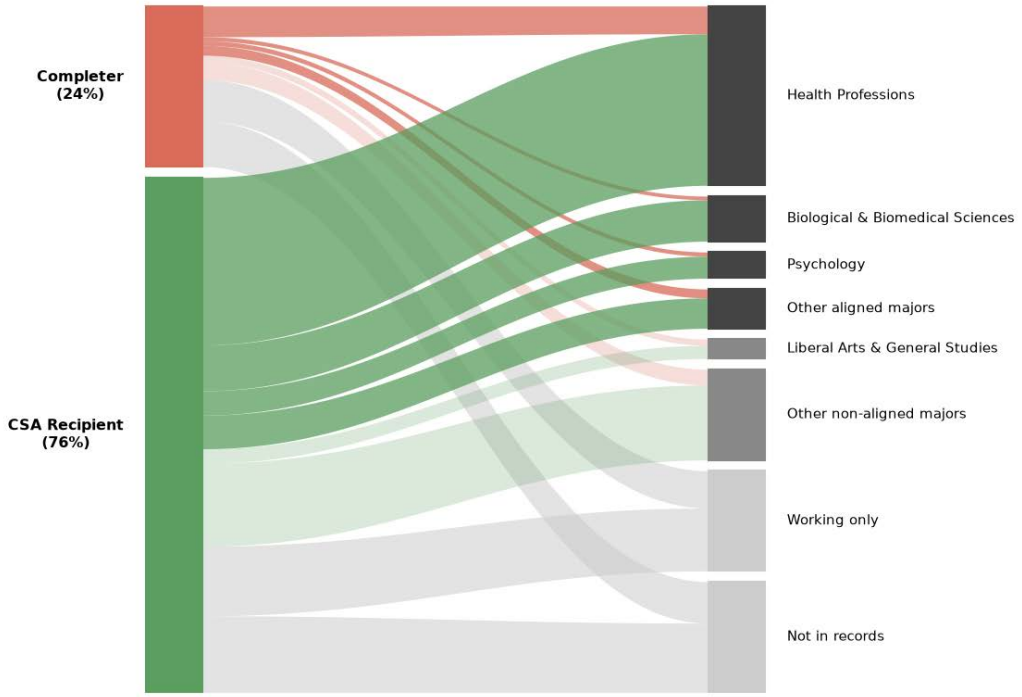
	Concentrator	Completer	CSA Recipient
	(0.021)	*(0.037)*	*(0.036)*
Cohort 2022	0.429***	0.385***	0.477***
	(0.021)	*(0.038)*	*(0.037)*
Cohort 2023	0.455***	0.408***	0.494***
	(0.022)	*(0.038)*	*(0.036)*
Agriculture	-0.1***	-0.105***	-0.117***
	(0.013)	*(0.016)*	*(0.022)*
Architecture	-0.066***	-0.065***	-0.081***
	(0.009)	*(0.011)*	*(0.015)*
Arts	-0.105***	-0.107***	-0.11***
	(0.005)	*(0.007)*	*(0.009)*
Business	0.142***	0.142***	0.137***
	(0.013)	*(0.016)*	*(0.021)*
Education	0.324***	0.304***	0.319***
	(0.011)	*(0.013)*	*(0.017)*
Finance	0.05**	0.071**	0.079*
	(0.019)	*(0.024)*	*(0.033)*
Government	-0.148***	-0.159***	-0.173***
	(0.015)	*(0.019)*	*(0.031)*
Health Science	0.153***	0.203***	0.219***
	(0.006)	*(0.007)*	*(0.009)*
Hospitality	0.126***	0.129***	0.115***
	(0.007)	*(0.008)*	*(0.012)*
Human Services	0.051***	0.071***	0.083***
	(0.012)	*(0.015)*	*(0.019)*
IT	-0.108***	-0.105***	-0.051***
	(0.007)	*(0.009)*	*(0.012)*
Law	-0.037***	-0.054***	-0.076***
	(0.01)	*(0.011)*	*(0.014)*
Manufacturing	-0.079***	-0.087***	-0.056**
	(0.011)	*(0.013)*	*(0.021)*
Marketing	-0.121***	-0.126***	-0.137***
	(0.009)	*(0.012)*	*(0.016)*

	Concentrator	Completer	CSA Recipient
STEM	0.022*	0.004	0.017
	(0.011)	*(0.012)*	*(0.015)*
Transportation	-0.104***	-0.117***	-0.166***
	(0.011)	*(0.013)*	*(0.02)*
Observations	**46,180**	**32,973**	**17,988**

SOURCE: Authors' analysis of NPWR data from 2016-2025.
NOTE: Regression is at the student-by-cluster level, and the CTE intensity indicators are the student's highest CTE intensity within cluster. Outcome is declaring an aligned major or working in an aligned industry, conditional on declaring a major or working in an industry with a NAICS code while not enrolled in college in that quarter, both in the first 2 years after projected on-time high school graduation. Indicators for missingness are included for student demographics. *p<.05, **p<.01, ***p<.001

Supplementary Sankey Charts

Figure E.5. College Major Destinations for Nursing Assistant CTE Students, Year 2 After High School



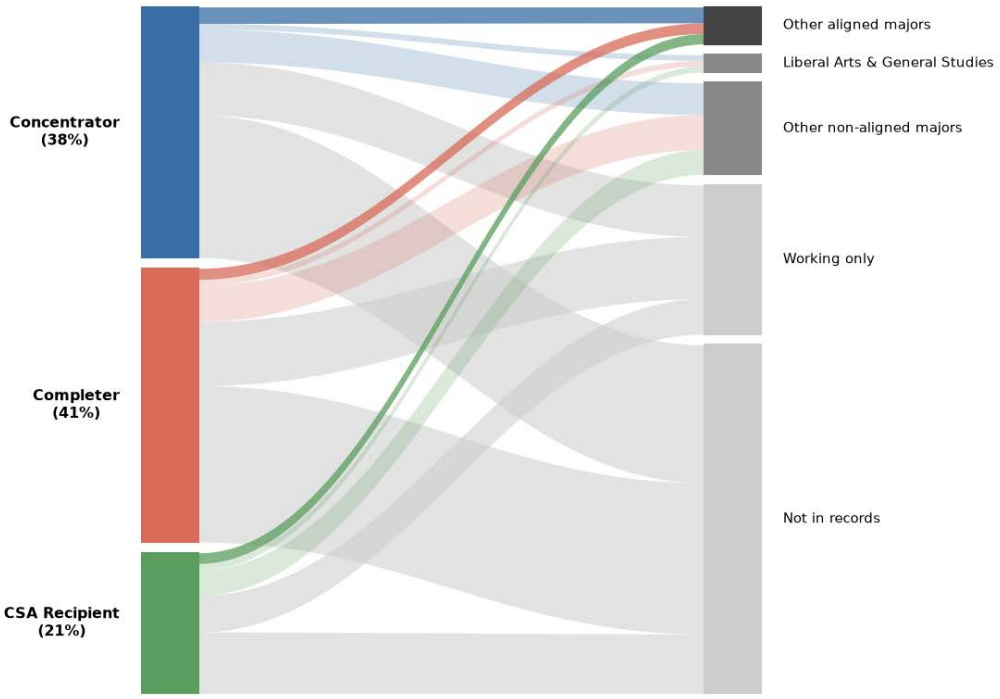
SOURCE: Authors' analysis of NPWR data from 2016-2025.
NOTE: n = 1,167 students (CSA recipients and completers). Concentrator-only students are not shown because no Concentrator-only students from this program enrolled in NSHE in year 2. Major fields with fewer than 35 students are combined: aligned fields (including Business and Management, Parks, Recreation and Fitness, and Public Administration) are shown as Other aligned majors; non-aligned Health Professions sub-fields and other non-aligned fields (including Science Technologies, Education, and Engineering) are shown as Other non-aligned majors. Darker shading indicates enrollment in an aligned college major.

Figure E.6. College Major Destinations for Community Health Science CTE Students, Year 2 After High School



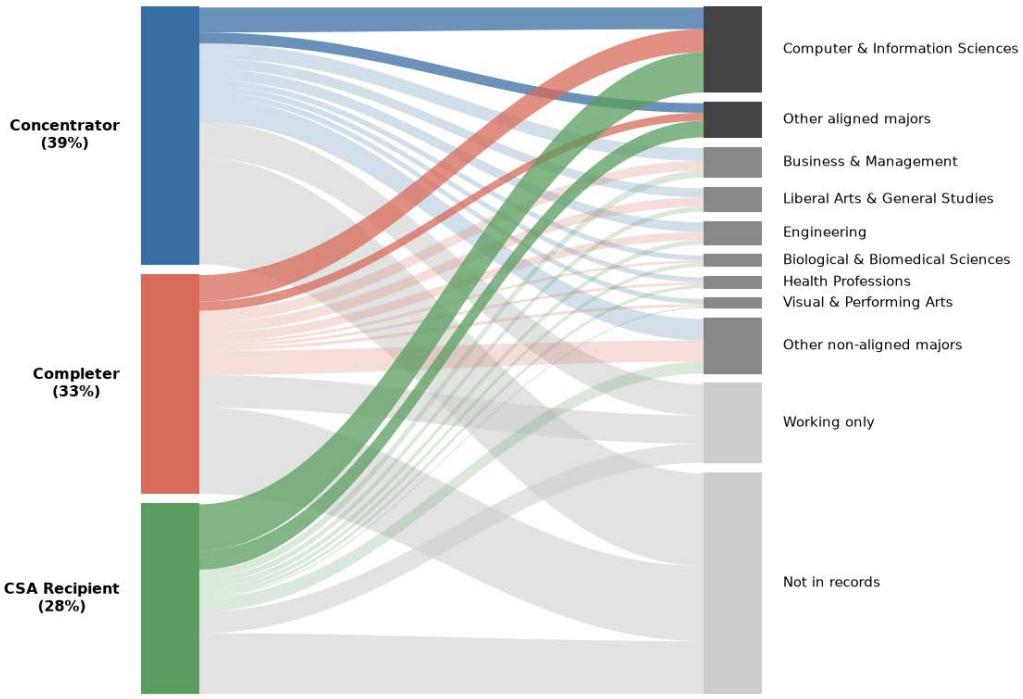
SOURCE: Authors' analysis of NPWR data from 2016-2025.
NOTE: n = 1,149 students (CSA recipients and completers). Concentrator-only students are not shown because fewer than 5 Concentrator-only students from this program enrolled in NSHE in year 2 Major fields with fewer than 35 students are combined: aligned fields (including Parks, Recreation and Fitness, Agriculture, and Public Administration) are shown as Other aligned majors; non-aligned Health Professions and Business and Management sub-fields and other non-aligned fields (including Education, Security and Protective Services, and Science Technologies) are shown as Other non-aligned majors. Darker shading indicates enrollment in an aligned college major.

Figure E.7. College Major Destinations for Welding Technologies CTE Students, Year 2 After High School



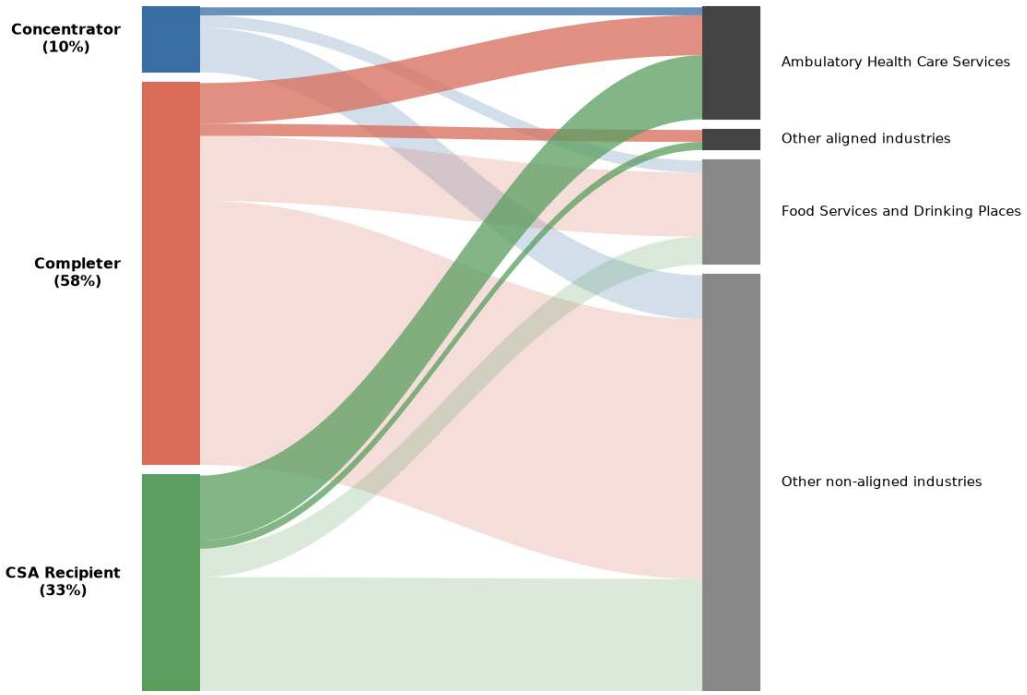
SOURCE: Authors' analysis of NPWR data from 2016-2025.
NOTE: n = 1,383 students. Major fields with fewer than 35 students are combined: aligned fields (including Engineering, Business and Management, and Engineering Technologies) are shown as Other aligned majors; non-aligned fields (including Precision Production, Health Professions, and Mechanic and Repair Technologies) are shown as Other non-aligned majors.. Darker shading indicates enrollment in an aligned college major.

Figure E.8. College Major Destinations for Computer Science CTE Students, Year 2 After High School



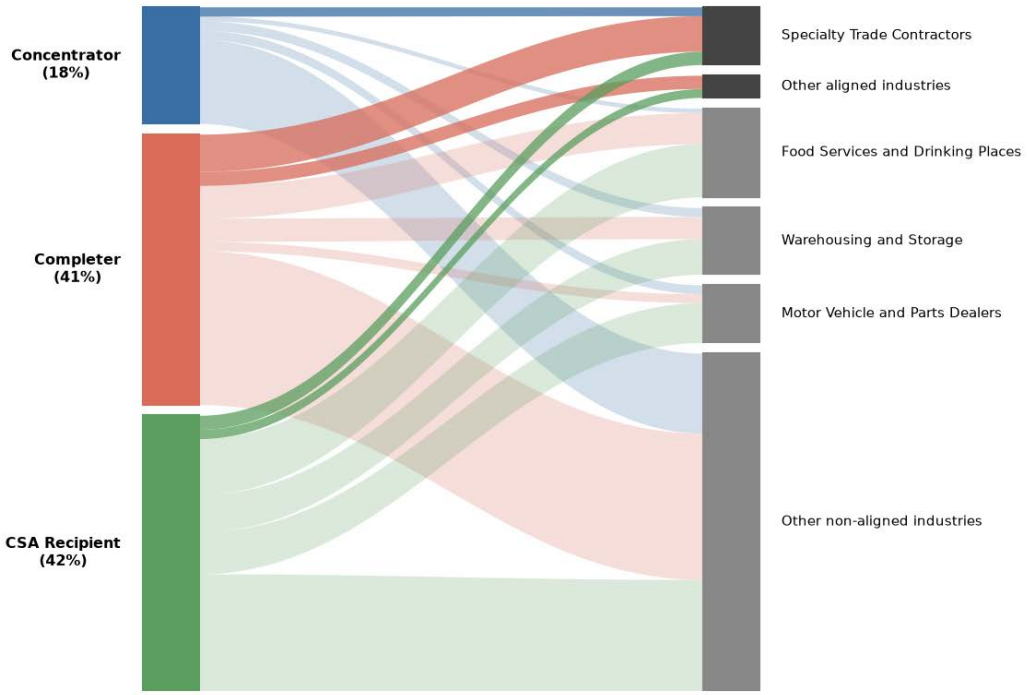
SOURCE: Authors' analysis of NPWR data from 2016-2025.
NOTE: n = 2,250 students. Major fields with fewer than 35 students are combined: aligned fields are shown as Other aligned majors; non-aligned fields (including Science Technologies, Engineering Technologies, and Mechanic and Repair Technologies) are shown as Other non-aligned majors. The Engineering destination bar reflects students in non-aligned Engineering majors; students in aligned Engineering sub-fields (e.g., Computer Engineering) are included in Other aligned majors. Darker shading indicates enrollment in an aligned college major.

Figure E.9. Industry Destinations for Emergency Medical Technician CTE Students, Year 2 After High School



SOURCE: Authors' analysis of NPWR data from 2016-2025.
NOTE: n = 164 students from the EMT cluster who were employed in year 2 after high school and not enrolled in college in year 2. Industry is defined as the sector with the highest earnings in year 2 for students with multiple employers. Industries with fewer than 10 students are combined: aligned industries (Educational Services and Hospitals) are shown as Other aligned industries; all non-aligned industries below the threshold are shown as Other non-aligned industries. Darker shading indicates employment in an aligned industry.

Figure E.10. Industry Destinations for Mechanical Technology CTE Students, Year 2 After High School



SOURCE: Authors' analysis of NPWR data from 2016-2025.
NOTE: n = 142 students employed in year 2 after high school and not enrolled in college in year 2. Industry is defined as the sector with the highest earnings in year 2 for students with multiple employers. Industries with fewer than 10 students are combined: Specialty Trade Contractors is the only named aligned industry; aligned industries below the threshold (including Heavy and Civil Engineering Construction, Construction of Buildings, and Repair and Maintenance) are shown as Other aligned industries; all non-aligned industries below the threshold are shown as Other non-aligned industries. Darker shading indicates employment in an aligned industry.

References

Advance CTE. (2024, October). *Advancing the framework*. https://careertech.org/career-clusters/advancing-the-framework/

Advance CTE. (2024, October). *Framework crosswalk: CIP, SOC, NAICS, career cluster, and sub-cluster.* https://careertech.org/resource/framework-crosswalk/

Altonji, J. G., Blom, E., & Meghir, C. (2012). Heterogeneity in human capital investments: High school curriculum, college major, and careers. *Annual Review of Economics, 4*, 185–223. https://doi.org/10.1146/annurev-economics-080511-110908

Brunner, E., Dougherty, S., & Ross, S. L. (2023). The effects of career and technical education: Evidence from the Connecticut technical high school system. *Review of Economics and Statistics, 105*(4), 1–46. https://doi.org/10.1162/rest_a_01098

Carruthers, C. K., Dougherty, S., Goldring, T., Kreisman, D., Theobald, R., Urban, C., & Villero, J. (2024). Career and technical education alignment across five states. *AERA Open, 10*, 23328584241276504. https://doi.org/10.1177/23328584241276504

Cellini, S. R. (2006). Smoothing the transition to college? The effect of Tech-Prep programs on educational attainment. *Economics of Education Review, 25*(4), 394–411. https://doi.org/10.1016/j.econedurev.2005.07.006

DeLuca, S., Plank, S., & Estacion, A. (2006, February). *Does career and technical education affect college enrollment?* National Research Center for Career and Technical Education, University of Minnesota.

Dembicki, M. (2026, February 5). *Credentials of value*. Lumina Foundation. Retrieved April 15, 2026, from https://strongernation.luminafoundation.org/credentials-of-value

Dougherty, S. (2018). The effect of career and technical education on human capital accumulation: Causal evidence from Massachusetts. *Education Finance and Policy, 13*(2), 119–148. https://doi.org/10.1162/edfp_a_00224

Dougherty, S. M., Gottfried, M. A., & Sublett, C. (2019). Does increasing career and technical education coursework in high school boost educational attainment and labor market outcomes? *Journal of Education Finance, 44*(4), 423–447. http://www.jstor.org/stable/45213901

Ecton, W. G., & Dougherty, S. M. (2023). Heterogeneity in high school career and technical education outcomes. *Educational Evaluation and Policy Analysis, 45*(1), 157–181. https://doi.org/10.3102/01623737221103842

Gottfried, M. A., & Plasman, J. S. (2018). Linking the timing of career and technical education coursetaking with high school dropout and college-going behavior. *American Educational Research Journal, 55*(2), 325–361. https://doi.org/10.3102/0002831217734805

Hemelt, S. W., Lenard, M. A., & Paeplow, C. G. (2019). Building bridges to life after high school: Contemporary career academies and student outcomes. *Economics of Education Review, 68*, 161–178. https://doi.org/10.1016/j.econedurev.2018.08.005

Kemple, J. J. (2008). *Career academies: Long-term impacts on work, education, and transitions to adulthood*. MDRC. https://www.mdrc.org/publication/career-academies-long-term-impacts-work-education-and-transitions-adulthood

Kreisman, D., & Stange, K. (2020). Vocational and career tech education in American high schools: The value of depth over breadth. *Education Finance and Policy, 15*(1), 11–44. https://doi.org/10.1162/edfp_a_00266

Mihaly, K., McCaffrey, D. F., Lockwood, J. R., & Sass, T. R. (2010). Centering and reference groups for estimates of fixed effects: Modifications to felsdvreg. *Stata Journal, 10*(1), 82–103. https://doi.org/10.1177/1536867X1001000109

Mihaly, K., Mulhern, C., Kennedy, K. E., Okuda-Lim, Z., Greer, L., Lee, J. C., Stevens, L., Mendoza-Graf, A., & Bellows, L. (2025, August 25). *Participation and outcomes for career and technical education students in Nevada* (RR-A4176-1, ED680410). RAND Corporation.

Nevada Department of Education. (2023). *CTE college credit*. Retrieved April 14, 2026, from https://doe.nv.gov/offices/craleo/cte/college-credit/

Nevada Department of Education. (2024). *Nevada's State Plan: Carl D. Perkins V, strengthening career and technical education for the 21st century act, effective July 1, 2024, through June 30, 2028*. Office of Career Readiness, Adult Learning, and Education Options. Retrieved April 14, 2026, from https://webapp-strapi-paas-prod-nde-001.azurewebsites.net/uploads/a_2024_nevada_perkins_v_four_year_state_plan_2_41c6628b39.pdf.

Nevada Department of Education. (2026). *Enrollment for Nevada public schools: 2025–2026 school year student counts as of 10/01/2025*. https://doe.nv.gov/offices/office-of-assessment-data-and-accountability-management-adam/accountability/data-requests/enrollment-for-nevada-public-schools

Nevada Governor's Office of Economic Development. (2025). *2025–2029 Nevada consolidated plan*. https://goed.nv.gov/wp-content/uploads/2025/08/2025-2029-Nevada-Consolidated-Plan.pdf

NV Coalition for the Improvement of Education. (2025). *Shortage information*. https://www.nvcoalition.com/shortage-information

Odle, T., & Russell, L. (2024). *The role of education-industry match in college earnings premia* (EdWorkingPaper No. 24-994). Annenberg Institute, Brown University. https://edworkingpapers.com/sites/default/files/ai24-994.pdf

Plasman, J. (2026, March). *College "or" career readiness? Postsecondary and labor market outcomes for Ohio high school students earning industry-recognized credentials* (ED681210). Thomas B. Fordham Institute.

Plasman, J. S., Gottfried, M. A., & Sublett, C. (2019). Is there a career and technical education coursetaking pipeline between high school and college? *Teachers College Record: The Voice of Scholarship in Education, 121*(3), 1–32. https://doi.org/10.1177/016146811912100303

Riggs, S., & Kennedy, C. C. (2025, August). *Career and technical education in Washington state: A longitudinal study of student access, participation, and outcomes*. Education Northwest. https://erdc.wa.gov/sites/default/files/2025-12/publication_202509_cte.pdf

Sando, V. (2026). *State policies impacting CTE: 2025 policy examples*. Advance CTE. Retrieved April 15, 2026, from https://careertech.org/blog/state-policies-impacting-cte-2025-policy-examples/

Scholaroo. (2024, March 4). *Teacher shortage by state*. https://scholaroo.nationaltoday.com/report/teacher-shortage-by-state/

Stevens, A. H., Kurlaender, M., & Grosz, M. (2019). Career technical education and labor market outcomes: Evidence from California community colleges. *Journal of Human Resources, 54*(4), 986–1036. https://doi.org/10.3368/jhr.54.4.1015.7449R2

Sultana, T., Andrews, M. E., & Giani, M. S. (2026). *Cheapskin effects? The heterogeneous value of industry-recognized certificates earned by high school students*. EdWorkingPaper No. 26-1412, Annenberg Institute, Brown University.

U.S. Bureau of Labor Statistics. (2026). *Job openings and labor turnover: Nevada*. https://www.bls.gov/regions/west/news-release/jobopeningslaborturnover_nevada.htm

U.S. Bureau of Labor Statistics. (2026). *Local area unemployment statistics*. https://www.bls.gov/lau/

U.S. Commission on Civil Rights. (2024, December 17). *Nevada advisory committee releases report on teacher and professional staff shortages and attrition*. https://www.usccr.gov/news/2024/nevada-advisory-committee-releases-report-teacher-and-professional-staff-shortages-and

U.S. Economic Development Administration. (2024, July 2). *Biden-Harris Administration's Tech Hubs Program awards approximately $21 million to Nevada Tech Hub to strengthen the region's capacity as a global leader in lithium batteries and electric vehicle materials*. https://www.eda.gov/news/press-release/2024/07/02/Nevada-Tech-Hub

Xu, Z., & Backes, B. (2024). Linkage between fields of focus in high school career technical education and college majors. *Educational Evaluation and Policy Analysis, 46*(3), 435–457. https://doi.org/10.3102/01623737231164149