Welcome to CTE News & More!

10 Year Washington CTE Study

With Special Guests: Sam Riggs & Camila Kennedy

December 3, 2025

Washington Office of Superintendent of PUBLIC INSTRUCTION

ERDC Education Research & Data Center

education northwest

Career & Technical Education in Washington State

A Longitudinal Study of Student Access, Participation, and Outcomes

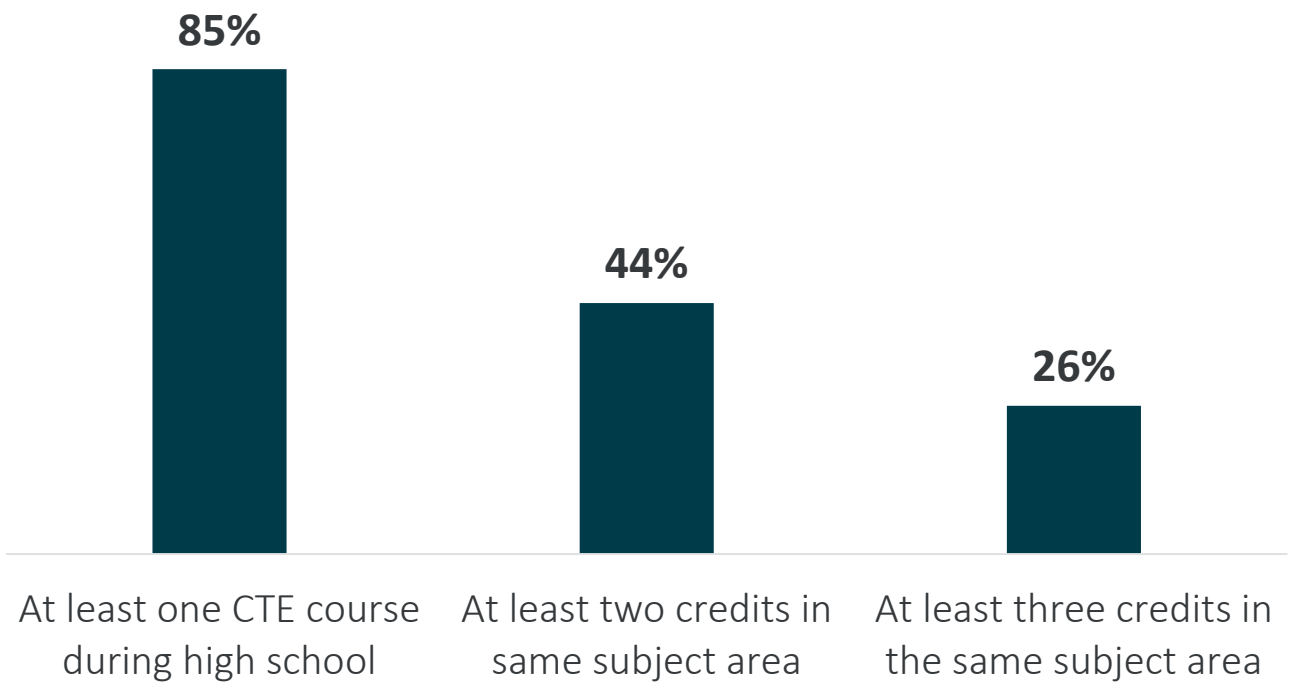
Sam Riggs & Camila Cigarroa Kennedy

December 3, 2025

ERDC Education Research & Data Center | Washington Office of Superintendent of PUBLIC INSTRUCTION | education northwest

Most students take at least some CTE during high school

Nationally



Source: National Center for Education Statistics, 2024

In Washington state

- All students are required to complete at least one credit in CTE to graduate (class of 2019 and beyond)
- 94 percent of students in the 2024 cohort earned at least one credit overall

What does this study do?

- Uses ERDC's P20W data to follow **750,000+ students** from high school and into postsecondary and workforce from 2013–14 to 2023–24
- Examines key questions related to **access, participation, and outcomes**
- Focuses on **credit attainment thresholds**—overall and within a single pathway

Data sources

- All Washington public high school students in grades 9–12 between 2013–14 and 2023–24
  - **High school** data from OSPI
    - CTE coursework based on state CIP codes
  - **Postsecondary** data from Washington and National Student Clearinghouse
  - **Labor market** data from Washington Unemployment Insurance
- ERDC connects student-level records across sources and provides a common research ID to track students from high school to college and into the workforce

Organization of CTE in Washington

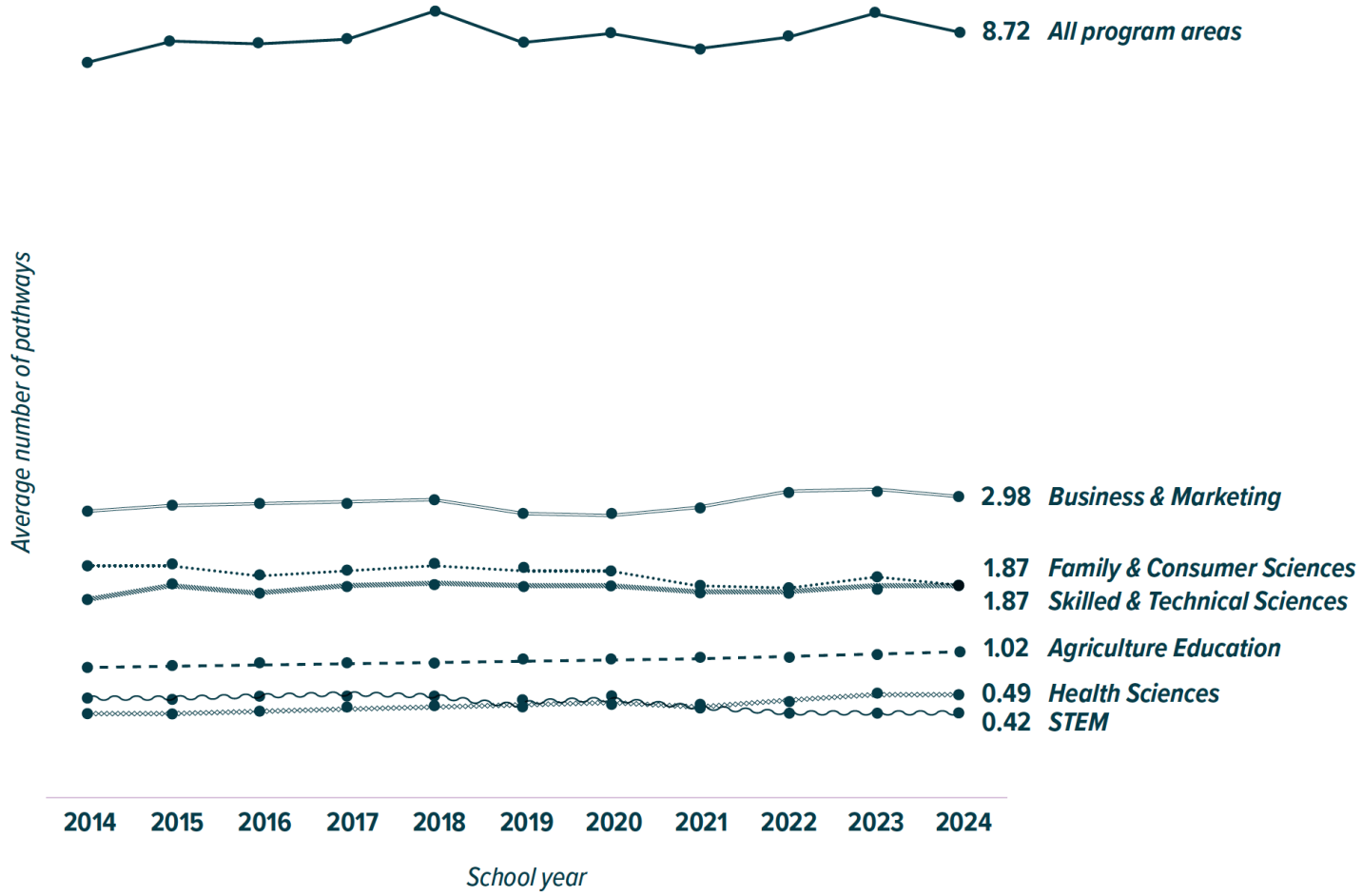
1. CTE coursework is organized into **six program areas** that reflect the state economy.
2. Each program area comprises one or more **career clusters** (n = 16) that correspond to a set of related industries in a field.
3. Each cluster includes multiple **pathways** (n = 64) made up of state-approved course sequences that prepare students to pursue advanced education or entry-level employment in a specific occupation or field.

Five Key Findings

1

At the state level, the provision of CTE has been steady since 2013–14

The average number of CTE pathways offered at Washington schools, overall and within program areas, has remained stable since 2013–14



Note: Figure includes all school types, including alternative schools, institutions, juvenile detention centers, reengagement schools, special education schools, traditional public schools, Tribal schools, and vocational/technical schools. A school is included if at least one student at that school enrolled in coursework during the school year. See main report appendix A, table A4, for more details.

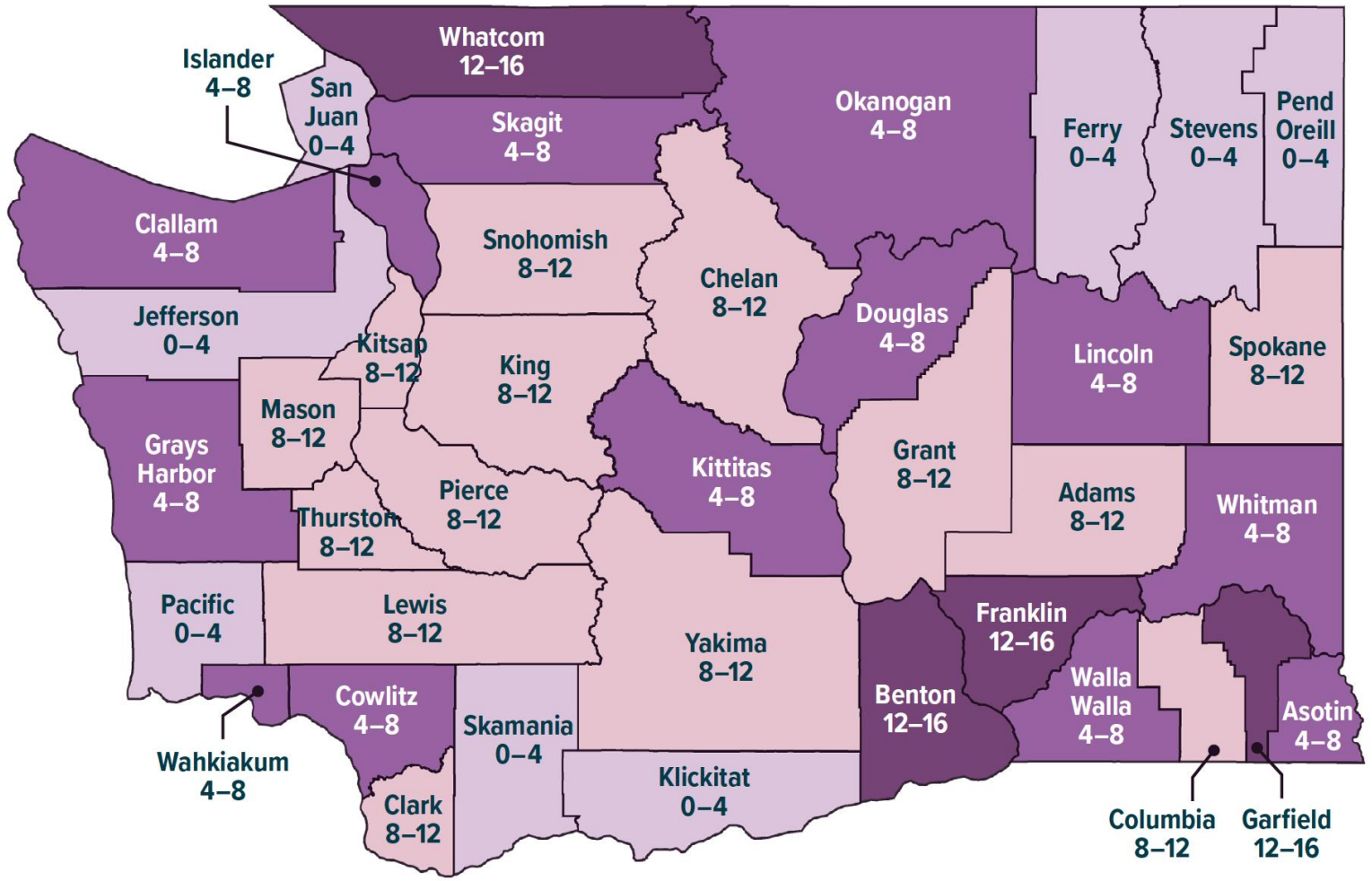
Source: Authors' analysis of ERDC P20W Integrated Data System.

The number of pathways offered at a school is related to school locale, income, and size

Note: School locale was defined using NCES locale codes. School income categories were based on the percentage of students eligible for free or reduced-price lunch (FRPL). High-income schools are schools in the lowest third of percentage of students eligible for FRPL (0–42.36%). Middle-income schools are schools in the middle third of percentage of students eligible for FRPL (42.47–64.30%). Low-income schools are schools in the highest third of percentage of students eligible for FRPL (64.31–100%). Schools were classified as large (420–3,198 students), medium (85–419 students), or small (6–84 students) based on whether they were in the top, middle, or lowest third of enrollment size in 2023–24. See appendix A, table A5 for more details.

Source: Authors' analysis of ERDC P20W Integrated Data System.

CTE pathway offerings are generally higher in population centers, but there is variation across the state

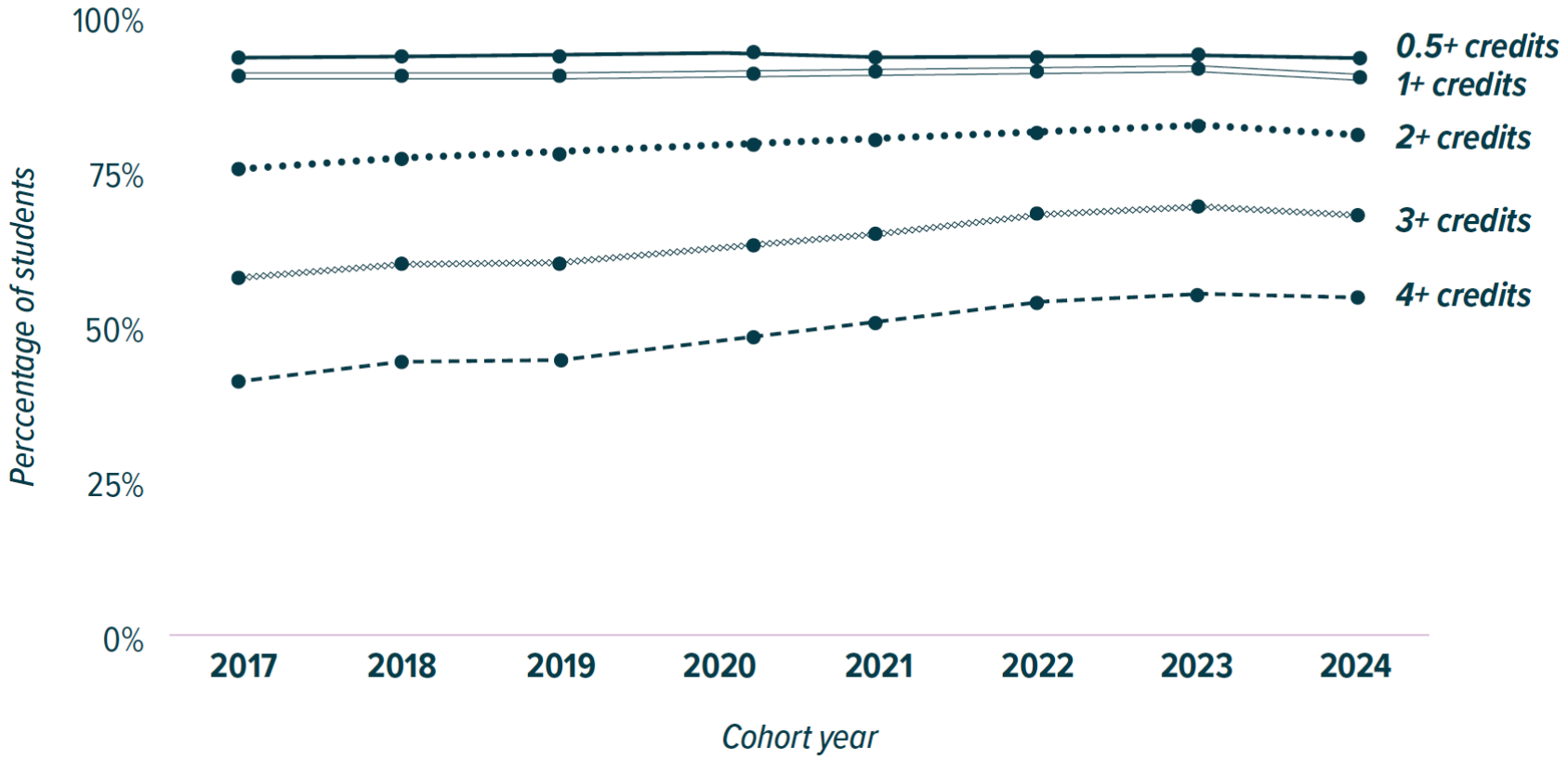


Note: Figure displays the average number of CTE pathways offered by a school in the 2023–24 school year, by county.
Source: Authors' analysis of ERDC P20W Integrated Data System and NCES Common Core of Data (school location).

2

Participation in CTE is high and has been growing over time

There is widespread participation in CTE in general, and it has increased over time



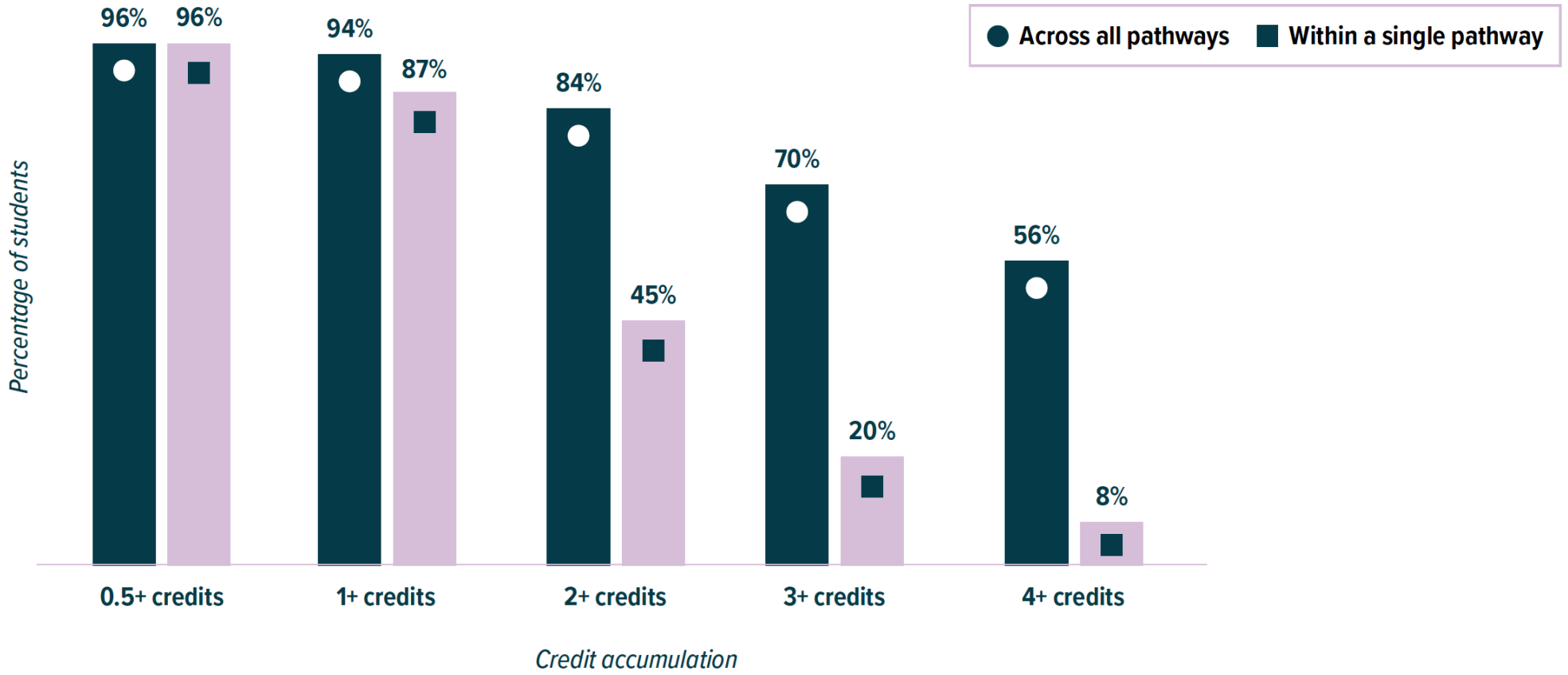
Note: Sample includes students continuously enrolled from grades 9 through 12. See main report appendix A, tables A8 and A9, for further details.

Source: Authors' analysis of ERDC P20W Integrated Data System.

3

Students are more likely to explore CTE broadly than to pursue in-depth study in a single pathway

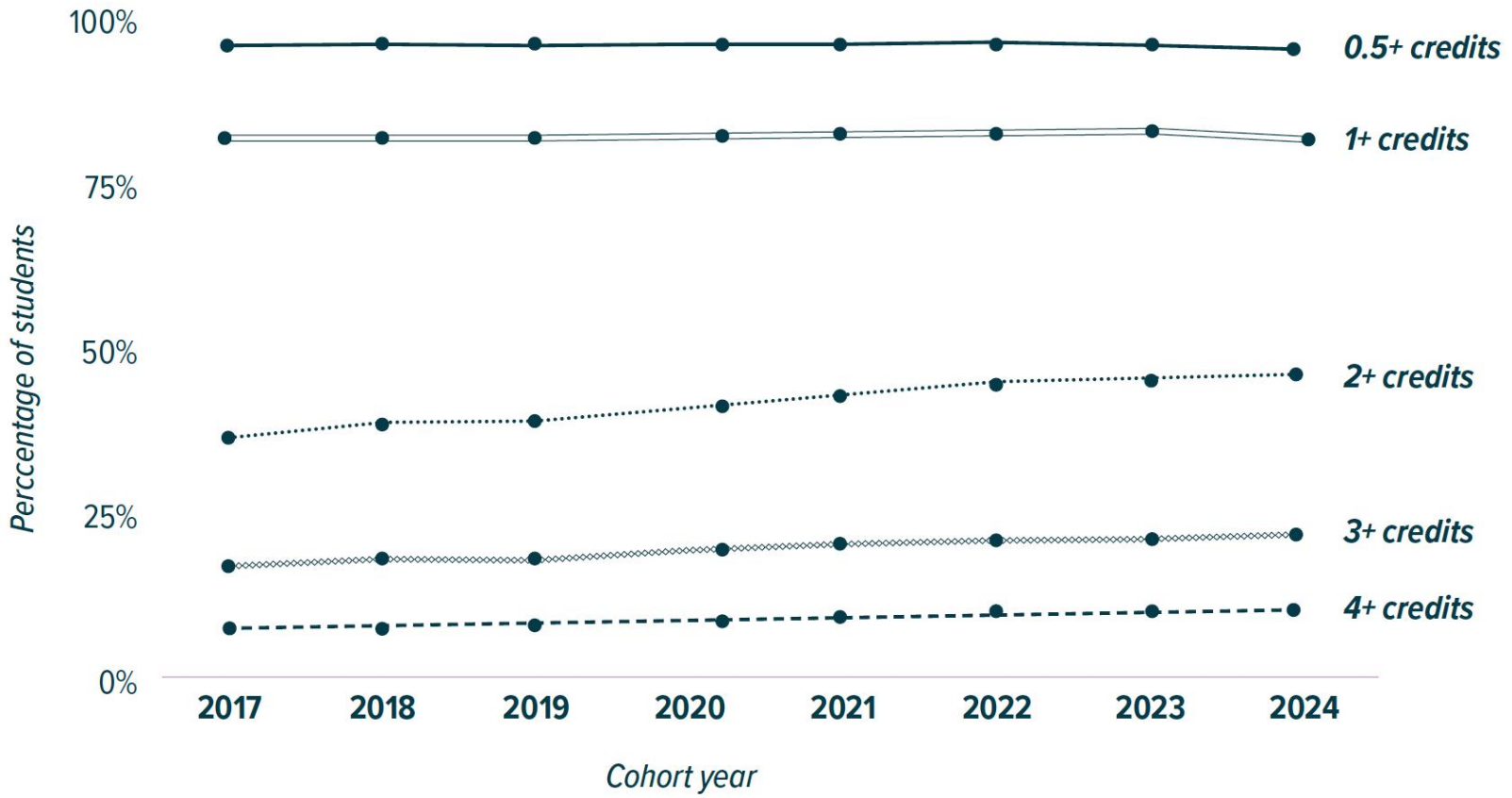
Most students explore CTE broadly, but fewer pursue in-depth study within a single pathway



Note: Sample includes students continuously enrolled from grades 9 through 12. See main report appendix A, table A9, for more details.

Source: Authors' analysis of ERDC P20W Integrated Data System.

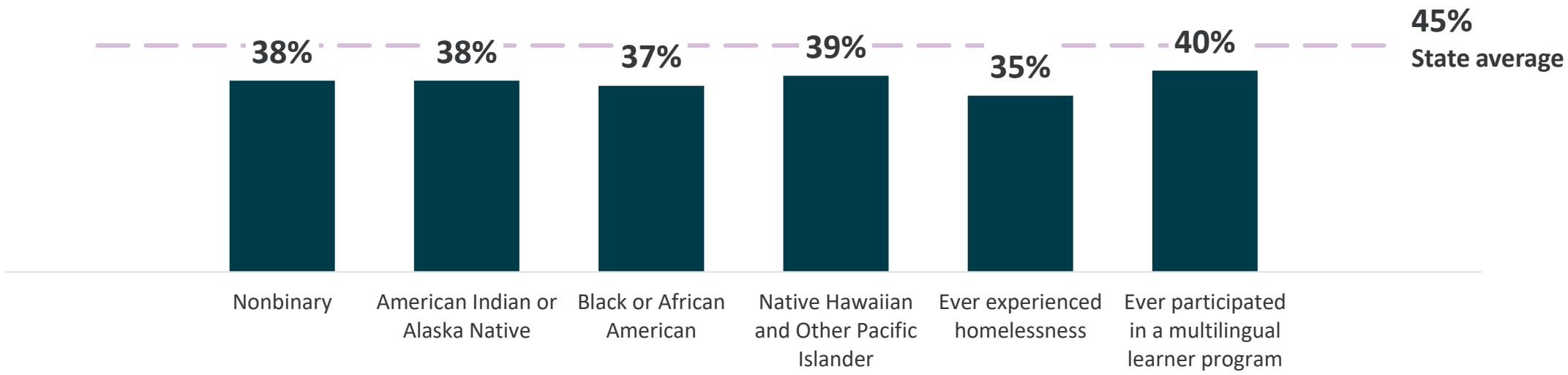
The percentage of students earning multiple credits within the same pathway has been increasing



Note: Sample includes students continuously enrolled from grades 9 through 12. See main report appendix A, table A9, for further details.

Source: Authors' analysis of ERDC P20W Integrated Data System.

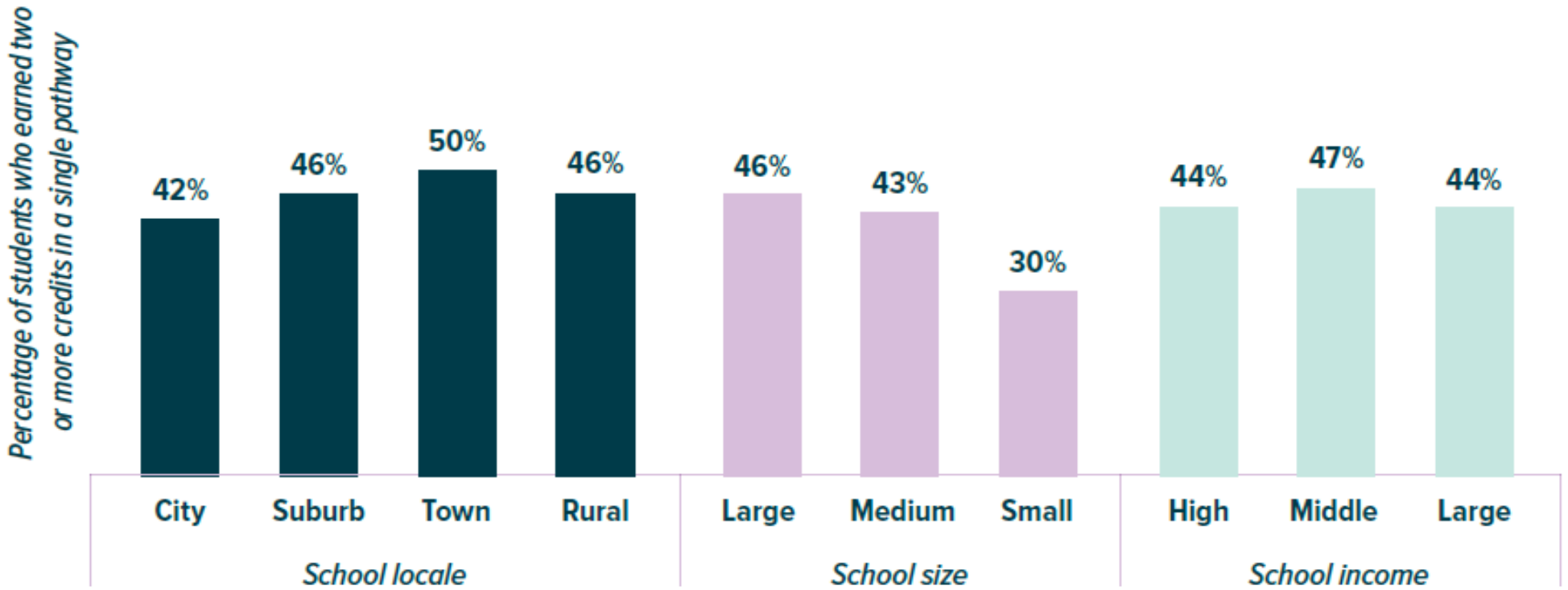
Students from historically underserved groups earned two or more credits within a pathway at lower rates than their peers



Note: Race and ethnicity categories follow federal reporting guidelines and may not fully capture the diversity of students' identities. These broad groupings can mask important differences in experiences among more specific racial and ethnic groups. See also main report appendix A, table A11, for more details.

Source: Authors' analysis of ERDC P20W Integrated Data System.

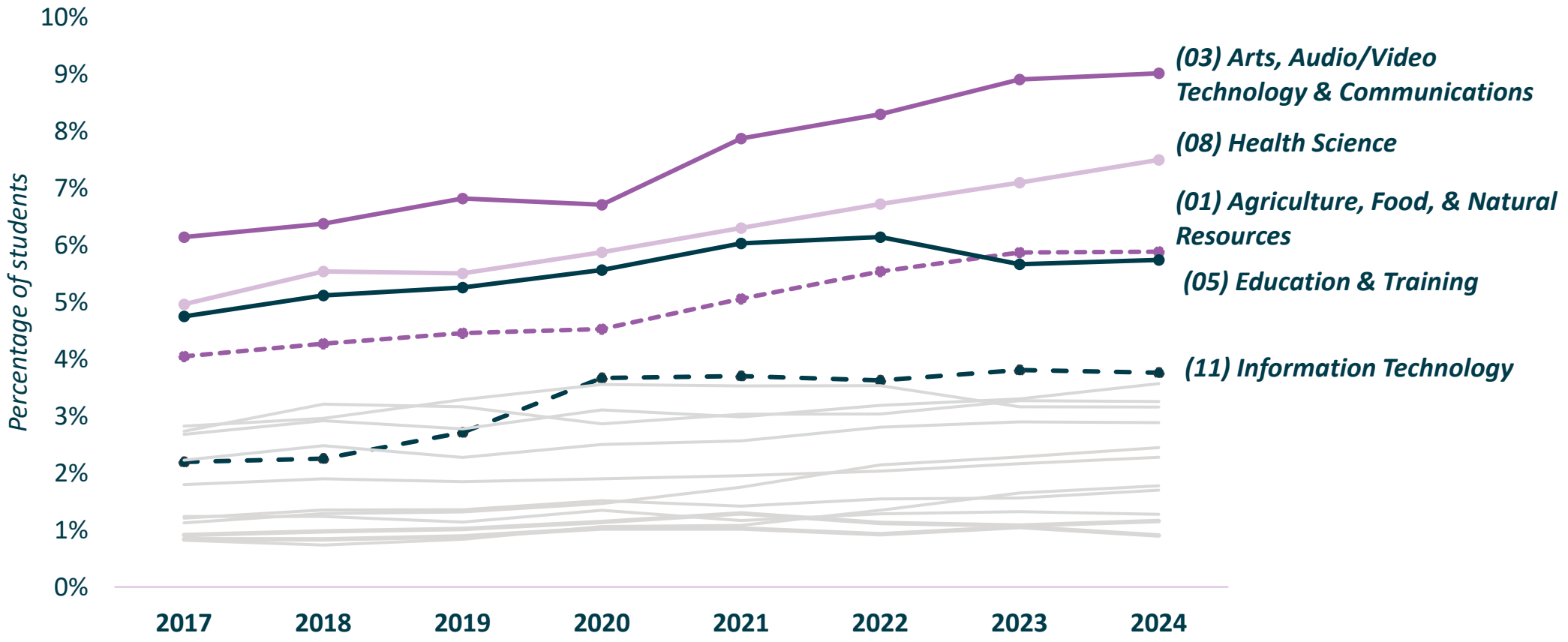
CTE credit attainment was relatively consistent across school locale and income, but differed by school size



Note: School locale was defined using NCES locale codes. School income categories were based on the percentage of students eligible for free or reduced-price lunch (FRPL). High-income schools are schools in the lowest third of percentage of students eligible for FRPL (0–42.36%). Middle-income schools are schools in the middle third of percentage of students eligible for FRPL (42.47–64.30%). Low-income schools are schools in the highest third of percentage of students eligible for FRPL (64.31–100%). Schools were classified as large (420–3,198 students), medium (85–419 students), or small (6–84 students) based on whether they were in the top, middle, or lowest third of enrollment size in 2023–24. See appendix A, table A5 for more details.

Source: Authors' analysis of ERDC P20W Integrated Data System.

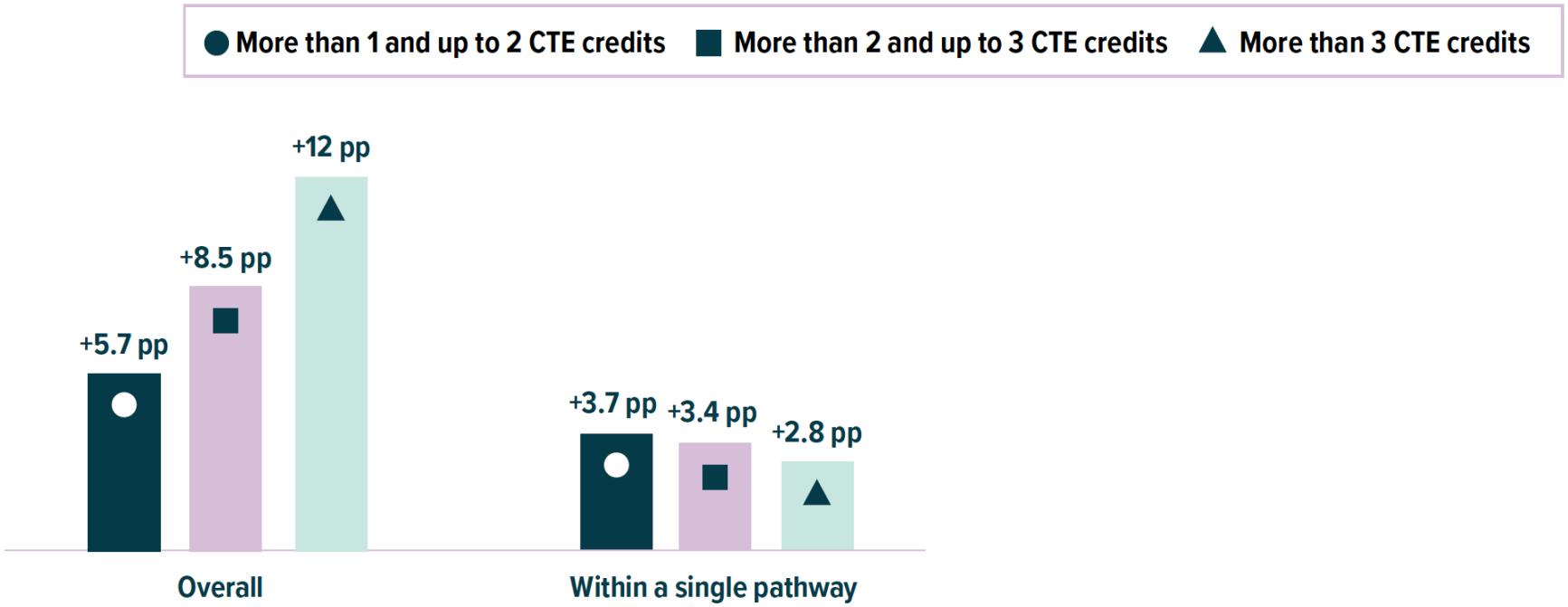
The percentage of students earning 2+ credits within the same pathway has been increasing for certain clusters more than others



4

Students who earned more credits in CTE were more likely to graduate from high school

Students who earned more credits in CTE—overall and within a single pathway—were more likely to graduate from high school



pp = percentage point.

Note: Vertical bars present statistically significant coefficients (alpha = 0.05) from ordinary least squares regression analyses that examine the relationship between different levels of CTE credit attainment overall on high school graduation. The bars represent the change in the probability that a student achieves the outcome, after adjusting for differences attributed to student demographics, academic achievement, experiences with dual credit and advanced coursework, schools attended, and cohort year. Students who earned 1 CTE credit or fewer are the reference category. See main report appendix C, tables C1 and C6.

Source: Authors' analysis of ERDC P20W Integrated Data System.

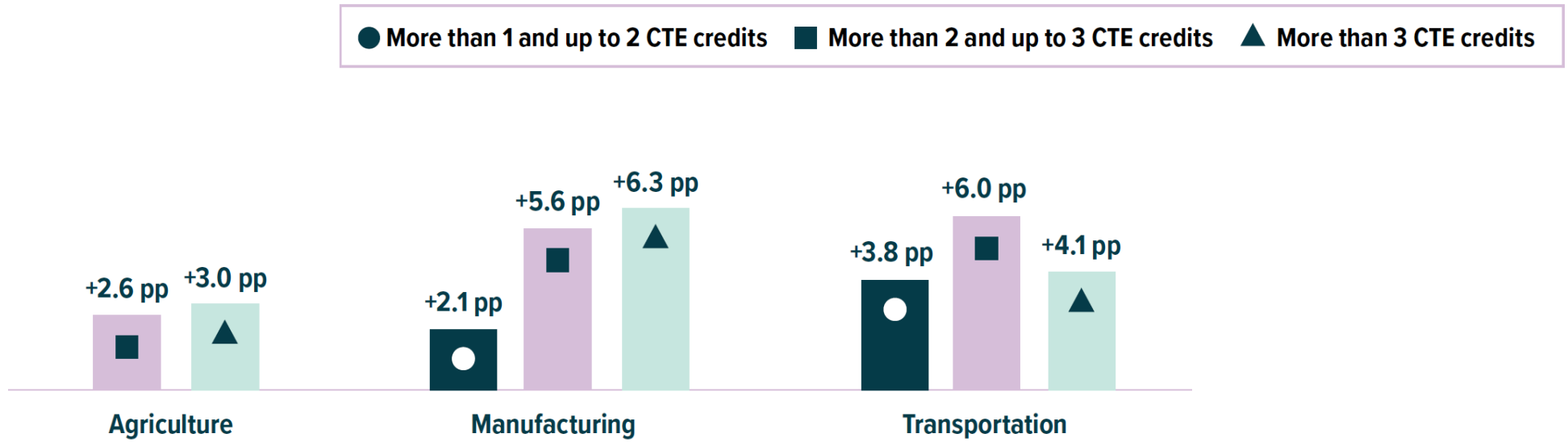
5

Students who focused their CTE studies in a single pathway were generally more likely to experience stronger postsecondary or labor market outcomes six years following high school, with outcomes varying by cluster

Pathways within Agriculture, Architecture & Construction, Manufacturing, and Transportation

Career Cluster	Pathways
Agriculture, Food, & Natural Resources	Agribusiness Systems Animal Systems Biotechnology Systems Environmental Service Systems Natural Resource Systems Plant Systems Power, Structural, and Technical Systems
Architecture & Construction	Construction Design & Pre-Construction
Manufacturing	Maintenance, Installation & Repair Manufacturing Production Process Development Production
Transportation, Distribution & Logistics	Transportation Operations

Students who earned more than one credit in a single pathway in the *Agriculture, Manufacturing,* and *Transportation* clusters were more likely to earn a certificate six years following high school graduation

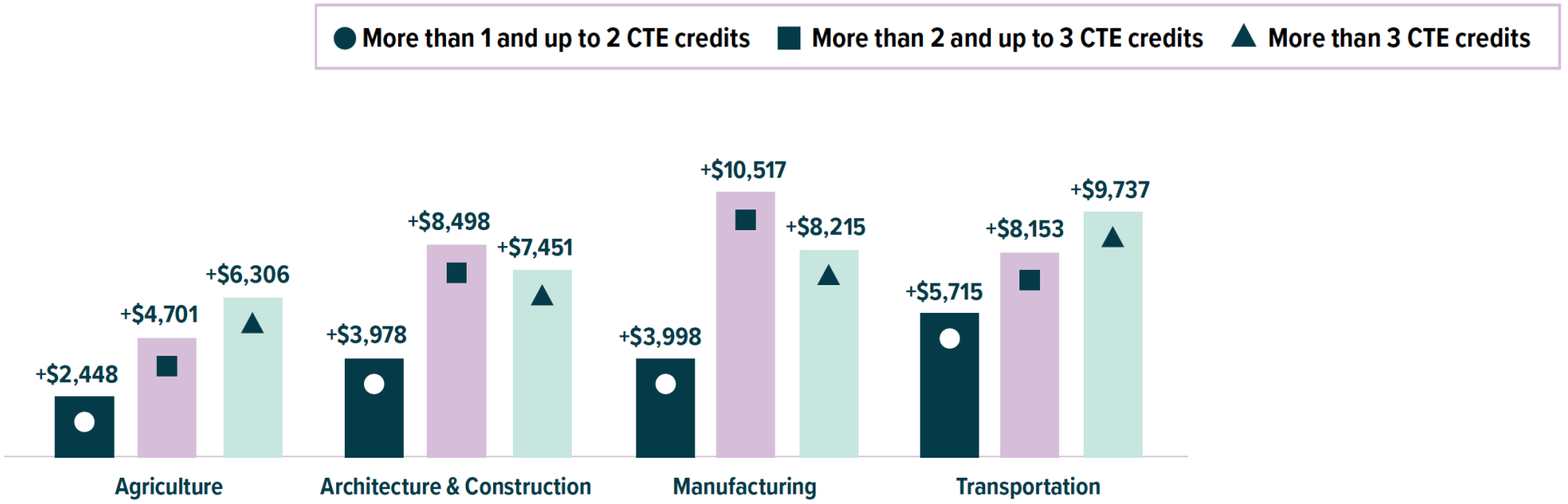


pp = percentage point.

Note: Vertical bars present statistically significant coefficients (alpha = 0.05) from ordinary least squares regression analyses that examine the relationship between different levels of CTE credit attainment by cluster on certificate attainment. The bars represent the change in the probability that a student achieves the outcome, after adjusting for differences attributed to student demographics, academic achievement, experiences with dual credit and advanced coursework, schools attended, cohort year, high school graduation, and postsecondary and labor market pathways following high school. Students who earned 1 CTE credit or fewer are the reference category. See main report table appendix C, tables C11, C35, and C41, for more details.

Source: Authors' analysis of ERDC P20W Integrated Data System.

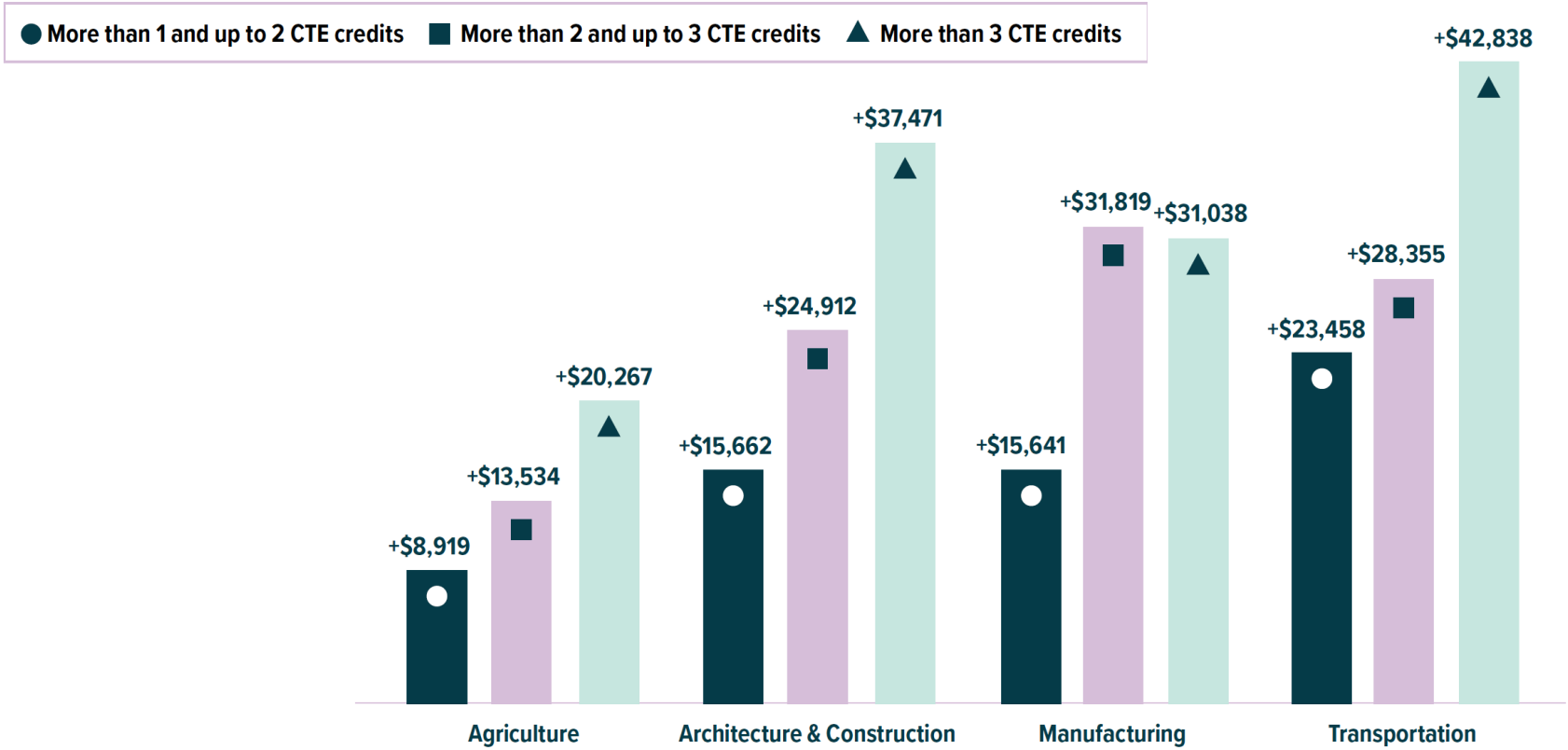
Students who earned more than one credit in *some pathways* were more likely to have higher annual earnings six years following high school



Note: Vertical bars present statistically significant coefficients (alpha = 0.05) from OLS regression analyses that examine the relationship between different levels of CTE credit attainment by cluster on annual earnings. The bars represent the change in the probability that a student achieves the outcome, after adjusting for differences attributed to student demographics, academic achievement, experiences with dual credit and advanced coursework, schools attended, high school graduation, college enrollment, and college completion. Students who earned one CTE credit or fewer are the reference category. See appendix C, tables C11, C13, C35, C41, for more details.

Source: Authors' analysis of ERDC P20W Integrated Data System.

These students were also more likely to have higher cumulative earnings through the six years following high school



Note: Vertical bars present statistically significant coefficients (alpha = 0.05) from ordinary least squares regression analyses that examine the relationship between different levels of CTE credit attainment by cluster on cumulative earnings from 2017–18 through 2022–23. The bars represent the change in expected earnings, after adjusting for differences attributed to student demographics, academic achievement, experiences with dual credit and advanced coursework, schools attended, high school graduation, college enrollment, and college completion. Students who earned 1 CTE credit or fewer are the reference category. See main report appendix C, tables C11, C13, C35, C41, for more details.

Source: Authors' analysis of ERDC P20W Integrated Data System.

Recommendations

Recommendations

1. Explore ways to promote **deeper engagement within a single pathway** while still maintaining flexibility for exploration
2. Consider CTE as a strategy to improve **male student outcomes**
3. Assess and strengthen **alignment between CTE pathways and local needs and opportunities**

Career and Technical Education in Washington State

Report, Infographic, Spotlight on Access to College Credit Opportunities Through CTE

Q&A

Infographic

Career and Technical Education in Washington State

Career and technical education (CTE) plays a key role in preparing students for postsecondary education and the workforce by blending academic and technical instruction with opportunities to earn college credit, gain work experience, and obtain industry-recognized credentials. Here, we share highlights from "Career and Technical Education in Washington State: A Longitudinal Study of Student Access, Participation, and Outcomes" and "Career and Technical Education in Washington State: Spotlight on Access to College Credit Opportunities through CTE." These reports use Washington State Education Research and Data Center (ERDC) P20W integrated data to explore patterns in student access to and participation in CTE programming, as well as the high school graduation, postsecondary, and labor market outcomes they achieved from 2013–14 to 2023–24.

See the full report for more information on data sources, methods, findings, and recommendations.

education northwest | ERDC Education Research & Data Center

KEY FINDINGS

At the state level, the provision of CTE has been steady since 2013–14.

Rural schools, low-income schools, and small schools offered fewer pathways, on average. The stability of CTE offerings across the state is somewhat surprising given changes in the state's economy over this time.

Opportunities for students to earn college credit through CTE Dual Credit have become more equitable over the last 10 years.

Schools across income levels offer a similar percentage of CTE Dual Credit courses, a program that enables students to earn college credit through CTE.

Participation in CTE is high and has been growing over time.

Among students in the 2024 cohort, 94 percent earned at least one credit in CTE overall. The share of students earning four or more credits in CTE overall rose from 42 percent (2017) to 56 percent (2024).

Students are more likely to explore CTE broadly than to pursue in-depth study in a single pathway.

Overall, 84 percent of students in the 2024 cohort earned at least two CTE credits across all pathways, while only 45 percent did so within a single pathway. Rates of earning at least two CTE credits in a single pathway were between 6 and 10 percentage points lower for several underserved groups, especially those who experienced homelessness, identified as American Indian/Alaska Native or Black, or were nonbinary.

Students who earned more credits in CTE were more likely to graduate from high school.

Compared to students who only took up to one credit in CTE, observationally similar students who earned more than one credit overall were 5.7 to 12.0 percentage points more likely to graduate from high school.

Students who focused their CTE studies in a single pathway were generally more likely to experience stronger postsecondary or labor market outcomes six years following high school, with outcomes varying by cluster.

Students focusing their studies in a single pathway—especially in Agriculture, Finance, Manufacturing, and Transportation—were more likely to complete a credential and earn a living wage six years after high school.

See reverse side for an overview of the relationship between different CTE credit attainment levels in a cluster and six-year outcomes for students who graduated in 2016–17 (the 2017 cohort). These state-level data provide a useful starting point for examining local CTE offerings but reflect limited outcomes—postsecondary completion and earnings within six years. They don't capture the full range of student experiences or long-term success, and outcomes likely vary by region based on how well CTE pathways align with local labor markets and postsecondary opportunities. *Deeper local analysis is needed to meaningfully inform any decision-making.*

How CTE credit attainment levels within a cluster relate to outcomes for the 2017 high school cohort

▲ **Positive impact –** Positive and statistically significant relationship with the outcome and none of the CTE credit attainment levels have a negative and significant relationship with the outcome.

▼ **Negative impact –** Negative and statistically significant relationship with the outcome and none of the CTE credit attainment levels have a positive and significant relationship with the outcome.

— **Mixed impact –** Both a positive and negative statistically significant relationship with the outcome or if exactly two CTE credit attainment levels are not statistically significant (and the other credit attainment level has either a positive or negative statistically significant relationship with the outcome).

○ **Null impact –** All three CTE credit attainment levels have no relationship with the outcome.

Cluster	*Agriculture, Food & Natural Resources*	*Architecture & Construction*	*Arts, A/V Technology & Communications*	*Business, Management & Administration*	*Education & Training*	*Finance*	*Government & Public Administration*	*Health Sciences*	*Hospitality & Tourism*	*Human Services*	*Information Technology*	*Law, Public Safety, Corrections & Security*	*Manufacturing*	*Marketing*	*Science, Technology, Engineering, and Mathematics*	*Transportation Distribution & Logistics*
Completion of any degree or credential by 2022–23	—	○	○	—	—	▲	○	▼	○	○	○	○	—	○	○	▲
Completion of certificate by 2022–23	▲	○	—	○	○	○	○	○	○	—	—	○	▲	○	—	▲
Completion of associate degree by 2022–23	○	○	○	—	○	▲	○	—	—	○	—	—	○	○	○	○
Completion of bachelor's degree by 2022–23	○	○	○	—	▼	▲	○	▼	○	○	—	○	○	○	—	○
Annual earnings in 2022–23	▲	▲	▼	▲	○	▲	○	—	—	—	▲	—	▲	—	▲	▲
Cumulative earnings through 2022–23	▲	▲	▼	▲	○	▲	○	○	▼	▼	▲	○	▲	○	—	▲
Earned a living wage in 2022–23	▲	▲	▼	▲	○	▲	—	○	○	○	▲	○	▲	—	▲	▲

Note: Table summarizes the regression results presented in appendix C of the main report. For each cluster, the table consolidates the three regression coefficients—representing different CTE credit attainment levels of more than one and up to two, more than two and up to three, and more than three credits—into a single indicator representing the overall impact of credit attainment.

Source: Authors' analysis of ERDC P20W Integrated Data System.

RECOMMENDATIONS

Promote deeper engagement within a single pathway.

Students who earned multiple credits in a single pathway achieved the strongest outcomes, yet not all students reach this level due to persistent disparities. While deeper engagement may improve outcomes, early specialization may not suit all students. Systemic barriers—not just individual choice—can limit participation. Addressing local barriers to participation and refining the CTE Graduation Pathway requirement could promote depth while allowing room for exploration.

Engage more male students.

The positive effects of CTE on high school graduation, completing a postsecondary certificate, annual earnings, and earning a living wage were even stronger for male students. Expanding access to and engagement in CTE could serve as a powerful strategy for addressing gender-based disparities in education and employment outcomes.

Strengthen alignment between CTE pathways and local needs and opportunities.

CTE pathways should reflect local economic needs, but offerings have remained largely unchanged despite major shifts in the job market. Some pathways show weak connections to postsecondary or labor market outcomes. To support student success and mobility, future research should assess alignment between CTE pathways and high-demand, high-wage careers and training opportunities—and identify ways to strengthen it. These insights can guide program improvements and help students make more informed choices.

Cluster	*Agriculture, Food & Natural Resources*	*Architecture & Construction*	*Arts, A/V Technology & Communications*	*Business, Management & Administration*	*Education & Training*	*Finance*	*Government & Public Administration*
Completion of any degree or credential by 2022–23	—	○	○	—	—	▲	○
Completion of certificate by 2022–23	▲	○	—	○	○	○	○
Completion of associate degree by 2022–23	○	○	○	—	○	▲	○
Completion of bachelor's degree by 2022–23	○	○	○	—	▼	▲	○
Annual earnings in 2022–23	▲	▲	▼	▲	○	▲	○
Cumulative earnings through 2022–23	▲	▲	▼	▲	○	▲	○
Earned a living wage in 2022–23	▲	▲	▼	▲	○	▲	—

Thank you!

Contact

Sam Riggs | sam.riggs@ednw.org

educationnorthwest.org

References

American Institute for Boys and Men. (2024, August 29). *The state of working class men.* American Institute for Boys and Men. https://aibm.org/research/the-state-of-working-class-men/

Brodersen, R. M., Gagnon, D., Liu, J., & Tedeschi, S. (2021). *The impact of career and technical education on postsecondary outcomes in Nebraska and South Dakota.* Regional Educational Laboratory Central. https://files.eric.ed.gov/fulltext/ED612630.pdf

Goldhaber, D., & Liddle, S. (2023, November 21). *Educational achievement and progression by gender in Washington: 6 key takeaways.* American Institute for Boys and Men. https://aibm.org/research/educational-achievement-and-progression-by-gender-6-key-takeaways/

Hollenbeck, K., & Huang, W. J. (2006). *Net impact and benefit-cost estimates of the workforce development system in Washington state.* Upjohn Institute. https://research.upjohn.org/up_technicalreports/29/

Lee, H. I., Rojewski, J. W., & Gregg, N. (2016). Causal effects of career-technical education on postsecondary work outcomes of individuals with high-incidence disabilities. *Exceptionality, 24*(2), 79–92. https://eric.ed.gov/?id=EJ1093654

References (continued)

Lindsay, J., Austin, M., Wan, Y., Pan, J., Pardo, M., & Yang, J. H. (2021). *Indiana and Minnesota students who focused on career and technical education in high school: Who are they, and what are their college and employment outcomes?* U.S. Department of Education, Institute of Education Sciences, National Center for Education Evaluation and Regional Assistance, Regional Educational Laboratory Midwest. https://eric.ed.gov/?id=ED613044

Lindsay, J., Hughes, K., Dougherty, S. M., Reese, K., & Joshi, M. (2024). *What we know about the impact of career and technical education: A systematic review of the research.* CTE Research Network. https://cteresearchnetwork.org/resources/2024-systematic-review

Mean, M. (2020). *Career and technical education in high school: Relationships to postsecondary trajectories and employment outcomes [Doctoral dissertation].* University of Maryland, Baltimore County.

National Center for Education Statistics. (2024). *Career and technical education in the United States. Condition of Education.* U.S. Department of Education, Institute of Education Sciences. Retrieved April 14, 2025, from https://nces.ed.gov/programs/coe/indicator/tob

Reeves, R., & Secker, W. (2024, March 29). *Degrees of differences: Male college enrollment and completion.* American Institute for Boys and Men. https://aibm.org/research/male-college-enrollment-and-completion/

References (continued)

U.S. Bureau of Economic Analysis. (2025). *SAGDP9 Real GDP by state*. https://apps.bea.gov/iTable/?reqid=70&step=30&isuri=1&year_end=-1&classification=naics&state=0&yearbegin=-1&unit_of_measure=percentchange&major_area=0&area=04000&year=-1&tableid=512&category=1512&area_type=0&statistic=1&selected_income_

Washington Roundtable. (2025). Skill up for our future: Washington state job growth to surge in high-demand industries. https://www.waroundtable.com/skillupwa/

Witzen, B. H. (2019). *The effect of high school career and technology education on postsecondary enrollment and early career wages.* Maryland Longitudinal Data System Center. https://mldscenter.maryland.gov/egov/Publications/ResearchReports/FinalCTEReportOctober2019.pdf