



Statewide Evaluation of Career and Technical Education Programs

Lauren Cassidy, Marshall Garland, Deborah Jonas, & Louise Yarnall

May 2020

What We Studied

In 2017, the Texas Education Agency (TEA) awarded SRI International and its subcontractor, Gibson Consulting Group, (the SRI/Gibson team) a contract to conduct a study to inform the state's efforts to improve career and technical education (CTE) programs. The SRI/Gibson team designed the study to help TEA learn more about the CTE programs offered across the state, the demographics of students enrolled in those programs, and the academic attainment and postsecondary outcomes of CTE participants. Given TEA's goals to improve the quality of CTE programs, the study also included development of a set of program quality metrics (PQM) that identify both the inputs and outputs of CTE programs and that are based on available evidence-based practices.

How We Analyzed the Data

The study addressed four research questions organized into two domains:

Landscape of Career and Technical Education Programs

1. What CTE career clusters are offered in Texas?
2. What are the demographic characteristics of students participating in CTE?
3. What are the characteristics of students enrolled in Texas CTE career clusters?

Program Quality Metrics

4. To what extent are Texas CTE graduates meeting Texas college and career readiness standards and successfully transitioning into the workforce or postsecondary institutions?

To describe the characteristics of CTE offerings and student participation in CTE across the state, as well as the secondary and postsecondary outcomes of CTE students compared to their peers, the research team examined longitudinal CTE career cluster availability between 2012–13 and 2017–18, and examined CTE student participation and outcomes for the 2015–16, 2016–17, and 2017–18 annual graduating cohorts using student records stored at the Education Research Center (ERC) at the University of Texas Austin.

To develop PQMs, the research team used information from the research literature and from applicable state and federal laws, and organized them into five performance domains: postsecondary readiness and alignment, labor market alignment, work-based learning opportunities, teaching quality, and employer-district partnerships. The framework includes metrics for which administrative data were and were not available to the research team, and the report includes outcomes for PQMs for which administrative data were available to the research team through the ERC.

What We Discovered

Research Question 1: What CTE career clusters are offered in Texas?

Between the 2012–13 and 2017–18 school years, Texas high schools offered a range of CTE programs within 16 career clusters. Examples include Health Science; Business Management & Administration; Agriculture, Food & Natural Resources; Human Services; Information Technology; Finance; Manufacturing, Marketing; Arts, A/V Technology & Communications; among others.

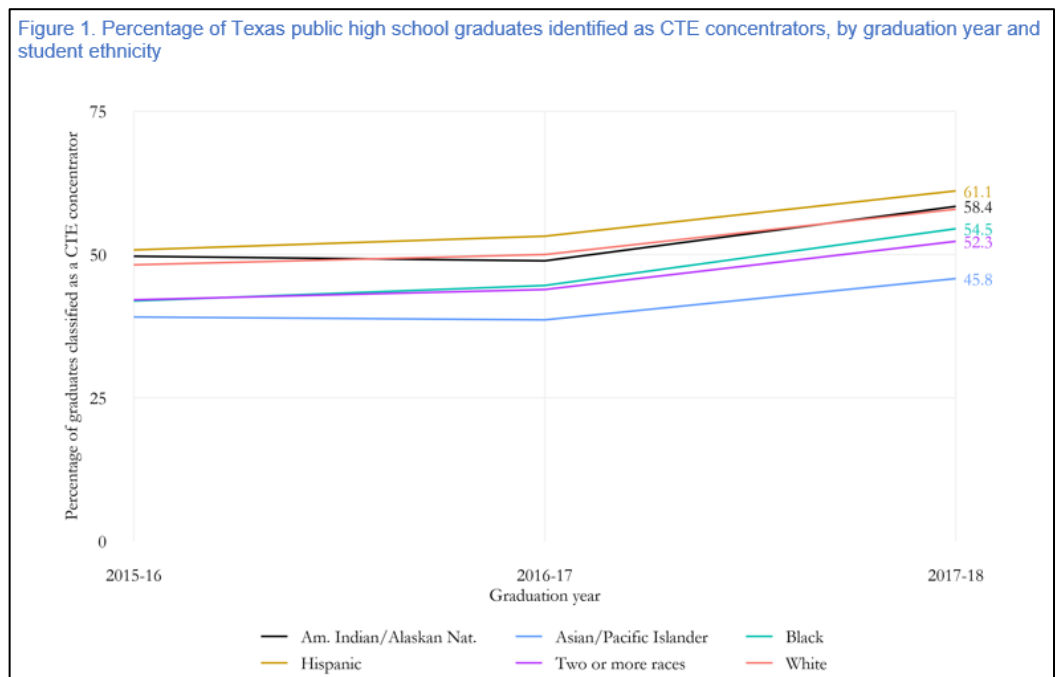
- The number of career clusters available varied by school characteristics, such as size and urbanicity, with more offerings at larger high school schools (13 to 14 clusters on average at the largest high schools compared to 2 to 4 clusters at the smallest schools) and at schools in suburban areas (11 clusters in suburban schools compared to 8 or 9 on average in cities and towns). The availability of CTE career clusters varied substantially across workforce development area (WDA).
- During the study period, the top five most commonly offered CTE career clusters were Health Science; Arts, A/V Technology, and Communication; Business Management and Administration; Agriculture, Food, and Natural Resources; and Human Services. The ordering of the most commonly offered cluster differed by WDA.

Research Question 2: What are the demographic characteristics of students participating in CTE?

Students' CTE status was obtained from accountability records indicating the intensity of students' CTE coursetaking during high school. The research team defined a CTE concentrator as a student with a 4-year plan of study to take two or more CTE courses for three or more credits during the student's graduation year. Non-concentrators were students who enrolled in at least one CTE course but did not have a 4-year plan of study to take two or more CTE courses for three or more credits (participants) and students who did not take any CTE courses (non-participants). Analyses were limited to three annual graduating cohorts: 2015–16, 2016–17, and 2017–18.

- The percentage of high school graduates designated as CTE concentrators rose by 10 percentage points between 2015-16 and 2017-18, with the majority of the change occurring between 2016-17 and 2017-18 (8 percentage points). This increase in CTE concentrators corresponds to the implementation of the Foundation High School Program (FHSP) and TEA's efforts to enhance the quality, access, and range of CTE courses and programs available to Texas students.

- Compared to students of other race/ethnicities, White and Hispanic students were the most likely to be CTE concentrators over the 2015–16 to 2017–18 period (Figure 1). Black students experienced the largest increase in the percentage of high school graduates designated as CTE concentrators (13 percentage points). With the exception of students who received special education services, the



increase in CTE concentration rates before and after the inception of the FHSP was comparable across student subgroups examined in this study (including sex, economic status, race/ethnicity, and special education status).

- The percentage of high school graduates who were CTE concentrators varied by campus characteristics and WDA. Students enrolled in town/rural campuses experienced higher concentrator rates over the period of analysis (70 percent in 2017-18 compared to 53 to 54 percent in suburban and city schools), despite campuses located in town/rural areas offering fewer CTE career clusters. Schools in South Texas had the largest proportion of CTE concentrators by 2017-18 (93 percent) compared to schools in the Capital Area that had the fewest (44 percent).

Research Question 3: What were the characteristics of students enrolled in Texas CTE career clusters?

Cluster Participation

- Across the 2015–16 to 2017–18 annual graduating cohorts, enrollment in Health Sciences; Science, Technology, Engineering, and Mathematics (STEM); and Law, Public Safety, Corrections and Security CTE career clusters increased among both graduating CTE concentrators and non-concentrators. Health Sciences and Agriculture, Food, and Natural Resources were the two most popular CTE career clusters in both 2015–16 and 2017–18.
- The percentage of students whose CTE coursetaking was focused in a single career cluster increased during the study period, with the largest increase in coherence occurring among CTE concentrators. The percentage of CTE concentrators enrolled in multiple career clusters dropped from approximately 26% in 2015–16 to 20% in 2017–18, suggesting CTE concentrators became more focused in their course selection over time, and this increased focus was correlated with the implementation of the FHSP.

Student Demographics by Cluster Participation

- CTE career cluster participation varied by race/ethnicity (Table 1). While participation was distributed across all career clusters among students of all race/ethnicities, the career clusters in which students participated most varied by race/ethnicity. For example, in 2017–18, 16% of White students took courses in the Agriculture, Food, and Natural Resources cluster; all other clusters had lower percentages of White students participating. During the same years, 24% of Asian/Pacific Islanders graduating from high school took their CTE courses in the Health Science cluster, and all other clusters had lower percentages of Asian/Pacific Islanders participating. Across racial/ethnic groups, the Arts, A/V Technology, and Communication CTE career cluster exhibited more equity in course-taking concentration over the 2015–16 to 2017–18 period.

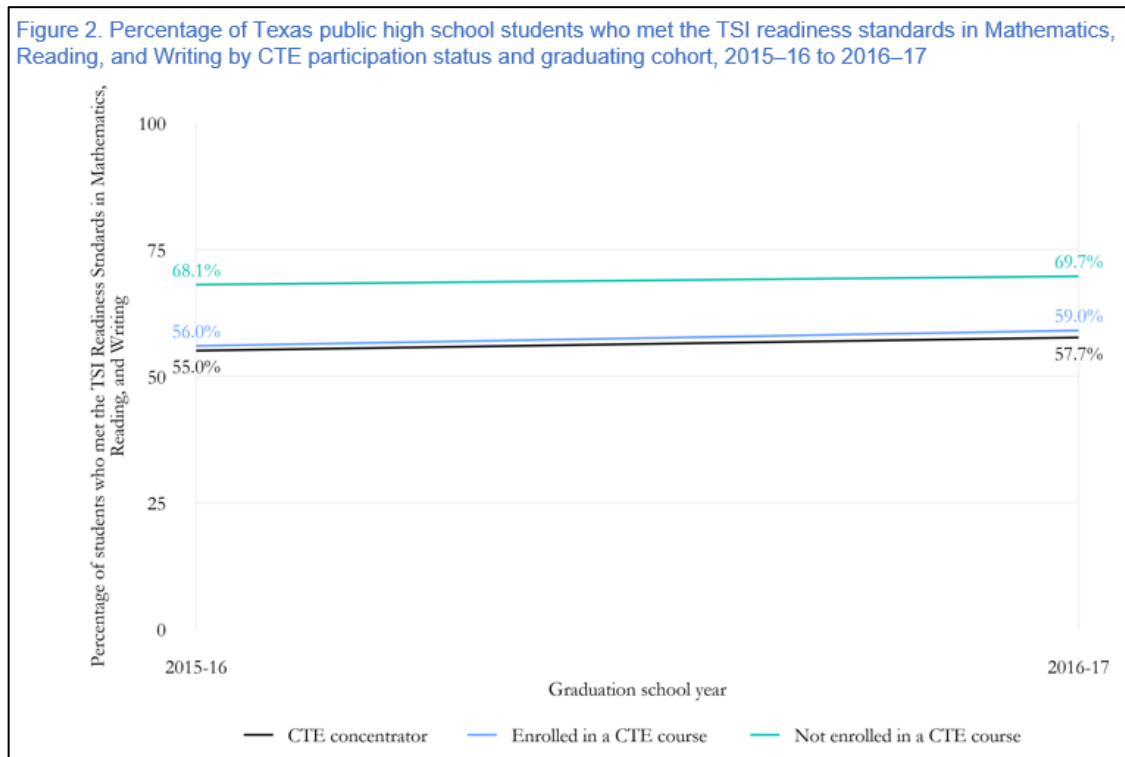
Table 1. Percentage of Texas public high school graduate assignment to a CTE career cluster, by race/ethnicity, 2017–18 graduates

CTE Career Cluster	Asian – Pacific Islander	Black	Hispanic	White
Agriculture, Food, & Natural Resources	251 (1.6%)	2,147 (5.0%)	11,112 (6.4%)	17,417 (16.3%)
Architecture & Construction	141 (0.9%)	592 (1.4%)	4,271 (2.5%)	1,437 (1.3%)
Arts, A/V Technology, & Communications	1,781 (11.1%)	4,163 (9.6%)	14,838 (8.6%)	9,541 (8.9%)
Business Management & Administration	994 (6.2%)	4,186 (9.7%)	12,893 (7.5%)	5,867 (5.5%)
Education & Training	51 (†)	513 (1.2%)	2,258 (1.3%)	1,238 (1.2%)
Finance	222 (1.4%)	520 (1.2%)	1,841 (1.1%)	1,383 (1.3%)
Government & Public Administration	15 (†)	58 (†)	332 (†)	56 (†)
Health Science	3,854 (23.9%)	5,484 (12.7%)	22,291 (12.9%)	11,530 (10.8%)
Hospitality & Tourism	131 (0.8%)	1,280 (3.0%)	3,838 (2.2%)	1,522 (1.4%)
Human Services	539 (3.3%)	3,672 (8.5%)	12,557 (7.3%)	7,077 (6.6%)
Information Technology	534 (3.3%)	1,158 (2.7%)	4,936 (2.9%)	2,414 (2.3%)
Law, Public Safety, Corrections, & Security	237 (1.5%)	1,970 (4.5%)	12,059 (7.0%)	3,538 (3.3%)
Manufacturing	30 (†)	204 (0.5%)	2,036 (1.2%)	797 (0.7%)
Marketing	166 (1.0%)	682 (1.6%)	1,341 (0.8%)	1,230 (1.2%)
Science, Technology, Engineering, & Mathematics	1,561 (9.7%)	2,149 (5.0%)	10,544 (6.1%)	5,749 (5.4%)
Transportation, Distribution, & Logistics	47 (†)	459 (1.1%)	3,627 (2.1%)	956 (0.9%)
Multiple ^a	4,204 (26.1%)	12,503 (28.9%)	45,729 (26.5%)	30,540 (28.6%)
No CTE courses	1,338 (8.3%)	1,581 (3.6%)	6,125 (3.5%)	4,599 (4.3%)

Research Question 4: To what extent are Texas CTE graduates meeting Texas college and career readiness standards and successfully transitioning into the workforce or into postsecondary institutions?

- **Performance on the Texas Success Initiative (TSI) Assessment:** The percentage of graduates who met the TSI standards in all three subject areas (mathematics, reading, and writing) increased across the 2015–16 and 2016–17 cohorts (data for 2017–18 were not yet available; Figure 2).

The largest increase was among students enrolled in a CTE course, but who were not concentrators (56% to 59%). For the 2016–17 graduating cohort, college readiness rates according to the TSI indicator were highest among students who did not take any CTE courses (70%) and lowest among students who were CTE concentrators (58%).



- **Algebra II completion:** A higher percentage of CTE concentrators in the 2015–16 to 2017–18 graduating cohorts completed Algebra II (87 to 88 percent compared with their peers who took a CTE course but were not concentrators and those who did not enroll in CTE courses in high school [81 to 82 percent]). For all student groups included in the analysis, the percentage of students completing Algebra II remained stable across the three graduating cohorts.
- **College-level course completion:** A larger percentage of non-CTE students in each of the graduating cohorts between 2015–16 and 2017–18 enrolled in AP or IB courses when compared with their peers who were CTE concentrators or took at least one CTE course in high school (a difference of 9 to 10 percentage points). CTE concentrators from the 2015–16, 2016–17, and 2017–18 graduating cohorts outpaced non-CTE students by 7 to 8 percentage points in completion of at least one dual credit course.
- **Earning of 12 dual credit hours:** Across all graduating cohorts, less than 10 percent of graduates earned 12 or more college credits in high school, though a higher percentage of CTE concentrators earned 12 or more college credits compared to non-concentrators. For example, among the 2017–18 graduating cohort, 10% of CTE concentrators completed at least 12 college credits compared to 7% of students who did not take CTE courses in high school.
- **Postsecondary enrollment:** Across the three graduating cohorts, more CTE concentrators were enrolled in college within a year of high school graduation than students who took a CTE course in high school but were not CTE concentrators and students who never enrolled in a CTE course in high school (between 3 and 7 percentage points more; Figure 3). However, between 2016–17 and 2017–18 postsecondary enrollment one year after high school dropped by 5 to 6 percentage points for all three groups of students. Moreover, a larger percentage of CTE concentrators and CTE course takers in all three cohorts enrolled in community colleges when compared with

students who did not take a CTE course in high school. Conversely, a larger percentage of students who never took a CTE course in high school enrolled in 4-year universities compared with CTE concentrators and CTE course takers.

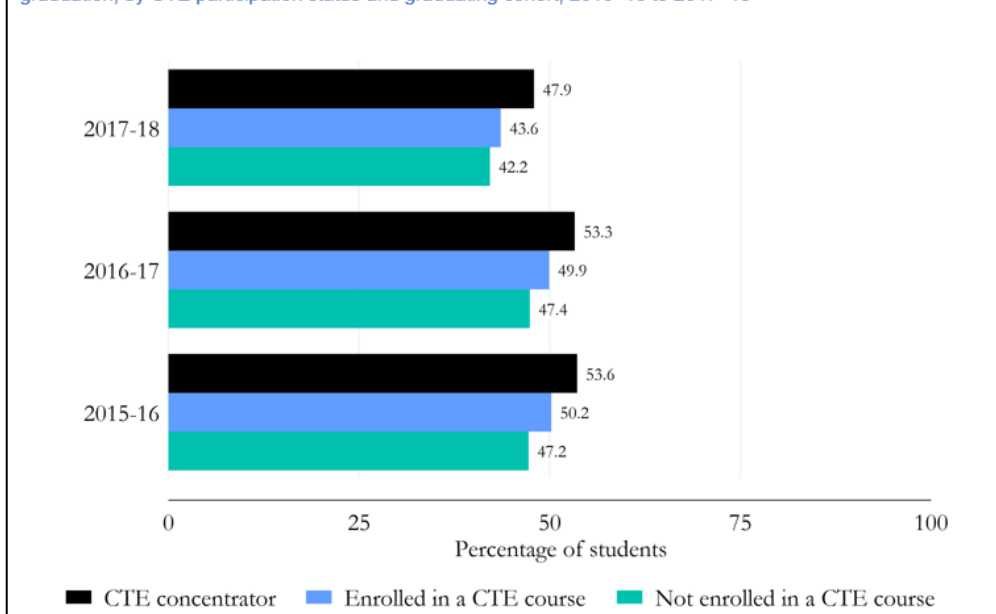
- **Postsecondary persistence:**

In both the 2015–16 and 2016–17 graduating cohorts (data for the 2017–18 cohort were not available), the persistence rates were roughly the same for CTE concentrators and students who took a CTE course but were not concentrators (approximately 70%).

However, a larger percentage of students who did not enroll in a CTE course in high school persisted into their second year of college (between 3 and 5 percentage points more).

- **Acquisition of an industry-based credential (IBC):** Across the 2016–17 and 2017–18 graduating cohorts, 6% of CTE concentrators earned at least one IBC, compared to approximately 1% of graduates who enrolled in CTE courses but were not concentrators. And, among graduates who *completed at least one IBC*, CTE concentrators completed 1.23 IBCs, compared to 1.21 IBCs for CTE enrollees and 1.17 for students not enrolled in a CTE course. Among CTE concentrators, the Certified Nurse Aide/Assistant IBC was the most frequently acquired certification. More commonly, certifications in the Information Technology career cluster—such as Microsoft-related IBCs and Quickbooks—were earned by non-CTE concentrators.
- **Employment after high school graduation:** A larger percentage of CTE concentrators were employed and enrolled at a postsecondary institution within four quarters of graduation when compared with their non-CTE peers. Additionally, a smaller percentage of CTE concentrators who graduated from high school in 2015–16 and 2016–17 were unemployed and not enrolled in a postsecondary institution within four quarters of high school graduation when compared with their counterparts who did not enroll in a CTE course in high school.
- **Median wages:** Employed CTE concentrators graduating from high school in 2015–16 and 2016–17 earned higher median wages within one year of graduation than their non-CTE peers. The median income within a year of high school graduation for employed CTE concentrators was \$6,680 for 2015–16 graduates and \$6,593 for 2016–17 graduates. Median wage earnings for employed non-CTE students were approximately three-quarters of the median wages earned by CTE concentrators.

Figure 3. Percentage of Texas public high school graduates who enrolled in college within 1 year of high school graduation, by CTE participation status and graduating cohort, 2015–16 to 2017–18



Policy Recommendations

The timing of this study coincided with changes in both state and federal policies meant to increase the rigor of and encourage student participation in CTE programming, corresponding with a shift in the skills and education students will need to succeed in the workforce (Cannon et al, 2019). Notably, Texas passed the FHSP, which revised high school graduation requirements and broadened access to academically rigorous CTE courses, and the federal government passed The Strengthening Career and Technical Education for the 21st Century Act (Perkins V), reauthorizing and updating the Carl D. Perkins Career and Technical Education Act of 2006 to ensure CTE programs meet the demands of the twenty-first-century economy, primarily through improving articulated programs of study

(POS) and increasing CTE program and workforce alignment. Limitations in data available during the study period restricted the SRI/Gibson team's analyses. While examining participation in career clusters provides valuable information on the broad fields in which students are taking CTE courses, it does not offer more fine-grained detail on the specific courses or the progression of students' coursetaking. For instance, Kreisman and Strange (2020) report a wage premium for students who take more upper-level CTE courses compared to students who take fewer. Analyses by POS would help address this shortcoming, by providing greater specificity and alignment with postsecondary programs and career opportunities and communicating more information about the level and types of courses a student completes. This emphasizes the critical need to track POS in the administrative data systems, which is already underway.

For the PQMs, which are designed to capture the universe of indicators that would inform the quality of a CTE program, data were available to analyze some indicators within domains 1 and 2, postsecondary readiness and alignment and labor market alignment, but data were not available for all indicators in these domains or for any indicators in the remaining domains of work-based learning (domain 3), teaching quality (domain 4), and district-employer partnerships (domain 5). The gaps suggest the need to update state-level data collection, such as better identification of work-based learning opportunities and the provision of occupational codes in the employment data. Many of the PQM indicators reflect the inputs into CTE programs, or the implementation factors that affect a program's ability to produce the intended outcomes, such as student employment in high-demand, high-wage industries. Measuring these implementation indicators requires qualitative data collection, such as surveys, interviews, focus groups, or additional program details on applications for federal funding. TEA may consider surveying or interviewing respondents at different levels of the system, such as CTE programs leaders at the school and/or local education agency (LEA), CTE educators (teachers and guidance counselors), industry and postsecondary partners, and CTE students. Such data collection could provide information on the availability of career exploration tools and opportunities, supports available to help students think about future plans and complete necessary coursework, teacher professional development in their CTE fields, guidance counselor's time spent counseling students on career choices and selecting courses aligned to their goals, and the level of involvement and input of industry and postsecondary partners to ensure alignment between CTE program offerings and the skills students need to succeed in those CTE fields.

In summary, TEA and other stakeholders have continuously invested in strengthening diverse aspects of CTE programs in the state. Changes in the last few years are grounded in new state and federal requirements, and best practices from the literature and CTE programs around the country. The state is in the process of articulating programs of study and aligning available IBCs with regional labor market needs. To maximize the value from these investments, it is critical for TEA to strengthen its data collections and monitoring systems to align with current needs and use the results of ongoing analyses to inform program improvements. The PQMs provide a framework and available and suggested data sources to support this process, which, when in place, will allow TEA to assess the relationships between varying levels of program quality and the outcomes students achieve.

References

- Cannon, S., Cassidy, L., Cox, M., Garland, M., Jonas, D., Levin-Guracar, E., McMurchy, M., & Yarnall, L. (2019). *Statewide evaluation of career and technical education programs: Interim Report*. Menlo Park, CA: SRI International.
- Carl D. Perkins Vocational and Applied Technical Education Act of 1990. (1990). Pub. L. No. 101-392.
- Carl D. Perkins Vocational and Applied Technical Education Act of 2006. (2019). Pub. L. No. 88-210.
- Kreisman, D. & Strange, 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.

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