



## Texas CTE: Career & Techology Education

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### What We Studied

Technology, industry, and vocation are changing. Today's jobs require enhanced skill sets and higher levels of education (Carnevale, Smith, & Strohl, 2010; Castells 2010; Hanushek, Woessmann, Brewer, & McEwan, 2010; Organization for Economic Cooperation and Development, 2016). Indeed, the jobs and careers of tomorrow are quickly turning towards proficiencies which require education beyond traditional high school diplomas. Policies and practices now focus on better transitions between high school, higher education, and the workforce—completing what is known as the P-16+ pipeline (Bailey, 2009; Kleinman, 2001). Reform also centers on reshaping what was known as vocational education into a modern, alternative path to better prepare students for College and Career Readiness (CCR).

Vocational education reorganization has been centered on encouraging better CCR, in a greater number of students. The use of the term vocational education has fallen out of favor and been replaced with Career and Technical Education (CTE). CTE has become more integrated and rigorous that includes advanced technology and new career paths. CTE courses today offer exposure to career planning and job exploration; they provide industry exposure through hands-on experiences and mentoring (Hutchins, B. C., & Akos, P. 2013; Rojewski, & Hill, 2014).

The most recent improvements to CTE have been the creation of advanced CTE+ (CTE+) programs which offer integrated academic content, technical skills and experiences, and advanced opportunities through credit based transition models. Credit based transition refers to courses which provide early access—and exposure—to higher education while students are still enrolled in high school (e.g., dual credit) (Bailey, Hughes, & Karp, 2002; Kim, & Bragg, 2008; King, & West, 2009). Advanced CTE+ programs are part of a regimented CTE course plan; they include a planned sequence of study in a defined field during high school which includes postsecondary training and leaves the student with some form of higher education credential upon completion (U.S. Department of Education, 2016).

Studies suggest the use of CTE may help with high school retention and graduation as well enhance the probability of enrollment and persistence in higher education (Allen, 2012; Brown, 2003; Cellini, 2006; Neild, & Byrnes, 2014; Stone, Aliaga, 2005; Zinth, 2014). These findings are especially true for students at greater risk of dropping out and receiving an incomplete education (Allen, 2012; Bragg, Loeb, Gong, Deng, Yoo & Hill, 2002; Brown, 2003; Wonacott, 2002; Zinth, 2014). Participation in advanced CTE+ specifically may lead to a greater probability of postsecondary success (Bailey, & Karp, 2003; Bragg, 2006).

The *Carl D. Perkins Vocational and Technical Education Act* (later the *Career and Technical Education Act*) was first authorized by the federal government in 1984 and reauthorized in 1998, 2006 and 2018. It provides funding for CTE, sets requirements for CTE courses and programs, and includes yearly accountability measures for states. The new law allows states to set their own goals for career and technical education programs without the education secretary's

approval, requires them to make progress toward those goals, and makes other changes to federal CTE law and describes program requirements for advanced CTE+ (Tech Prep or POS programs).

Federal contexts are not the only area in which CTE is shaped. The state of Texas has increased CTE participation through reforms over a number of years (HB2401, 1999; SB1809, 2005). The latest legislation includes changes to graduation plans and diplomas. Passed in 2013, this new diploma structure involves basic courses, advanced features, and requires students to select an endorsement program. Currently there are five endorsement programs which each encapsulate several CTE career clusters: *Science, Technology, Engineering, and Mathematics (STEM)*, *Business and Industry*, *Public Services*, *Arts and Humanities*, and *Multi-Disciplinary Studies*. These new graduating requirements have pushed CTE to the forefront of reform as all students are required to take a greater number of CTE courses in fulfillment of their endorsement.

## **How We Analyzed the Data**

The Texas ERC provides access to high quality, longitudinal data from Texas agencies. Texas ERC data resources span from the PK level through higher education (P-16) and into the workforce. For this project, PK-12 and postsecondary data is used to describe high school and postsecondary outcomes at various transitions in the P-16+ pipeline. For this report, student participation in CTE was collected and coded according to popular (and scholarly) conceptions of regular, CTE, and advanced CTE+ students (Bragg, & Reger, 2002; Castellano et al, 2003; Stipanovic et al, 2012). Advanced CTE+ students are described as those taking part in either: 1) a number ( $\geq 2$ ) of advanced CTE+ courses or 2) a program with progression of advanced CTE+ courses. An advanced CTE+ course is defined as a CTE course which also counts for college credit through some form of credit based transition (e.g., dual credit).

Two forms of credit based courses were combined with CTE courses to create advanced CTE+ comparison groups. The first is Dual Credit (DC) in which students simultaneously enroll in both high school and college courses earning credit in both. In addition, Advanced Technical Credit (ATC) courses allow schools to offer credit for technical courses which are taught at the college level by teachers with special training. Both DC and ATC courses were matched with CTE indicators to create a CTE+ course, one in which a CTE course was taken for college credit.

## **What We Discovered**

This section overviews student participation in CTE the following school years: 2011-2012, 2012-2013, 2013-2014, and 2014-2015. Most students in this section are in the midst of their high school career and have yet to complete all of their intended classes. As such, outcomes on these students are limited. These outcomes include information on students who are enrolled in at least one CTE course as per their yet-unfinished course files.

Figure 1 depicts the ethnicity of students by graduate cohort broken down by participation in advanced CTE+ courses. Texas participation is somewhat similar to the ethnic breakdown of the state and growing number of Hispanic students in the school population. Over time the percentage of Hispanic students taking CTE+ courses and advanced CTE+ increased; this is a positive result suggesting Texas is working to improve participation in its minority-majority population.

**Figure 1. Ethnicity of Texas High School Graduate Cohorts by Year**

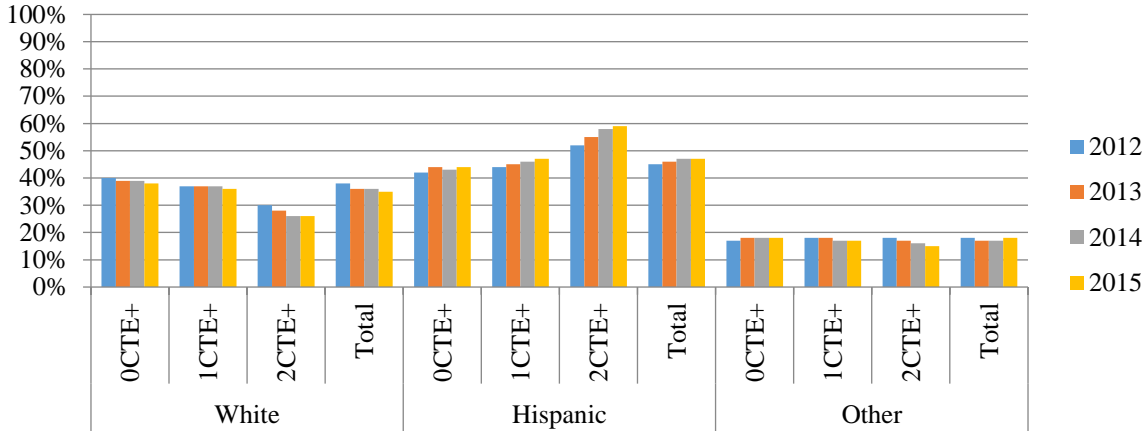
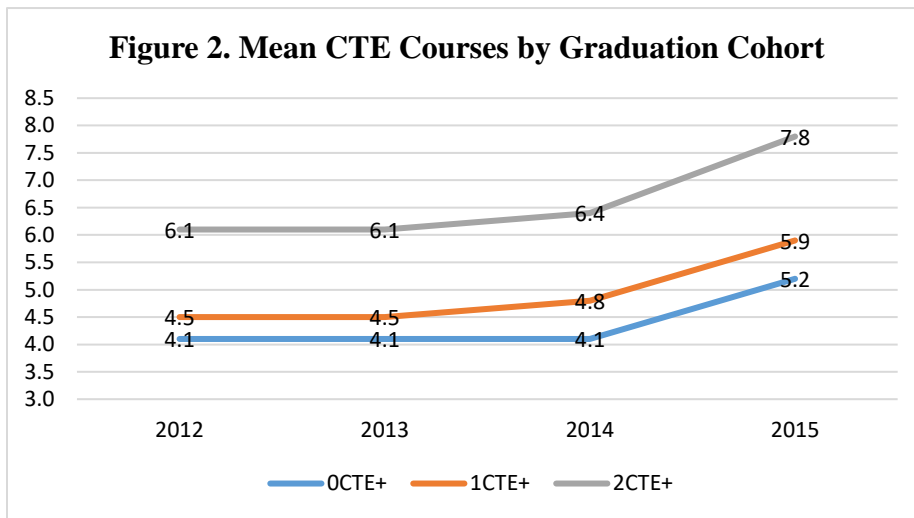


Figure 2 shows CTE participation for each cohort. 2CTE+ means for Texas was 6.1-7.8. CTE has been on the rise with a sharp increase in CTE course taking that occurred with the 2015 graduating cohort. This may be due to changes in policy.

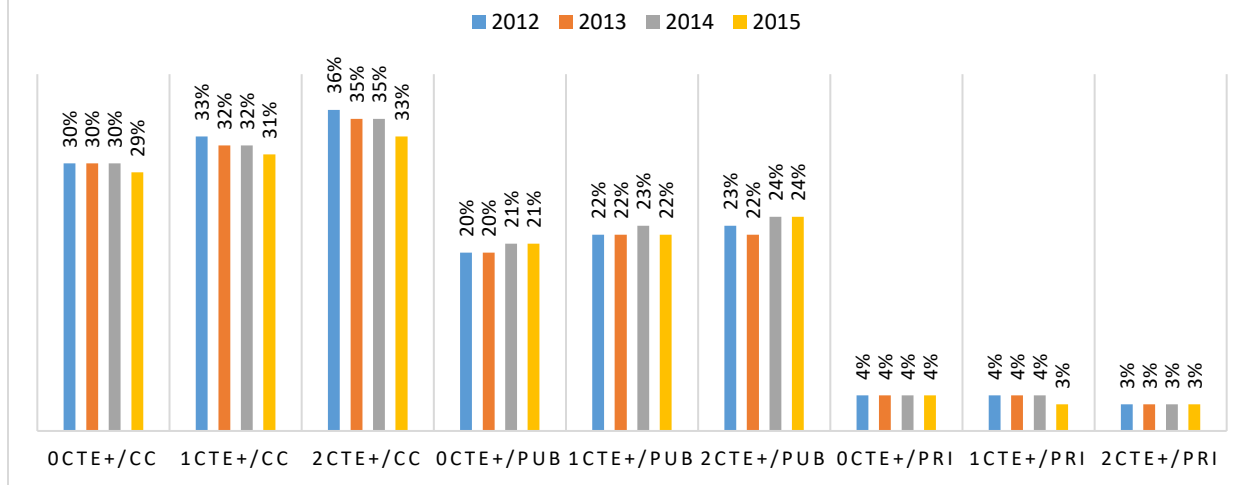
**Figure 2. Mean CTE Courses by Graduation Cohort**



**Post High School Transitions**

Figure 3 shows the breakdown of higher education institutions (CC, Public University, or Private University) enrollment for the 2012, 2013, 2014, and 2015 cohorts. Overall, Texas students who were in advanced CTE+ were the most likely to attend community college (ranging between 33-36%). Overall, smaller numbers of students (4%) transitioned to private universities and between 21-22% attended a public institution. Participation in an advanced CTE+ program is associated with higher rates of public university enrollment the year after high school. In all, over half of high school graduates were shown to enroll in higher education within a year. Overall participation in one or more CTE+ course positively impacted year-one postsecondary enrollment. Participation in advanced CTE+ increased the rate of attendance at community college and public universities; it had little to no impact on private university attendance

FIGURE 3. ENROLLMENT IN CC, PUB., AND PRI. POST HS TRANSITION YEAR



**Postsecondary Attainment**

This section covers the attainment of a postsecondary credential by each high school cohort, 2012-2015. Each high school graduating class was tracked against higher education graduating data to determine whether or not they had completed a program, what degree/certificate they received, and what time to degree they had taken. Older high school cohorts have more connected years of higher education data, thus have larger and more complete information on attainment.

**Postsecondary Graduation**

This first section shows higher education attainment by year, including degree attainment concurrent with high school graduation. Each cohort is defined by how long they had the opportunity to access higher education. Completion rates are broken down by regions and course groupings. Course grouping are differentiated by the number of advanced CTE+ (courses where students earn both CTE and college credit). For each cohort, total higher education completion is presented along with a yearly summation; the earliest year represents higher education graduation concurrent with high school completion.

Table 1. Percent of Total Student and Students Enrolled in Higher Education Gaining a Postsecondary Credential, 2012 HS Cohort

	Cohort HE Grad	Enroll HE Grad	Cohort CERT	Enroll CERT	Cohort AA	Enroll AA	Cohort BD	Enroll BD
Texas								
0CTE+	17%	28%	2%	3%	5%	9%	10%	16%
1CTE+	18%	28%	2%	3%	6%	9%	10%	16%
2CTE+	19%	29%	3%	4%	8%	11%	9%	14%
Total	17%	28%	2%	3%	6%	9%	10%	16%

\*Numbers are presented as the percent of students who graduated high school and then went on to gain a higher education degree.

Table 1 tabulates higher education attainment for the 2012 cohort, the group with four years of postsecondary access. Seventeen percent of the total cohort completed some form of postsecondary credential, representing 28% of students who had enrolled in higher education. Results suggest less than one-fourth of students received a postsecondary degree even though larger numbers of student enrolled and participated in higher education courses. Across the state, CTE+ may have provided a slight advantage in completing a postsecondary credential as well (19% for 2CTE+ compared to 17% overall).

### Postsecondary Credentials

This section goes into more depth; it breaks down postsecondary degrees by the type of credential received: certificate, associate’s degree, or bachelor’s degree. There are three specific types of credentials were tracked for further analysis: certificates, associate’s degrees, and bachelor’s degrees. These three forms of degrees were counted across all institution types including community colleges, public and private universities, and health related institutions.

*Certificates:* Advanced Technology Certificates (ATCs), Level 1 Certifications (15-42 SCH), Level 2 Certifications (43-59 SCH), or Level 3 Enhanced Skills Certificates;

- *Associate’s Degrees (AD):* Associate of Arts (AA), Associate of Applied Arts (AAA), Associate of Applied Science (AAS), Associate of Arts in Teaching (AAT), and Associate of Science (AS) degrees, as well as others defined by the institution; and
- *Bachelor’s Degrees (BD):* All forms of Bachelor of Arts (BA) and Bachelor of Science (BS) degrees as well as the Bachelor of Applied Technology (BAT).

In addition to the type of credential, time to degree was also measured. Time to degree is defined as the normal timeframe typically assumed to complete a degree or certificate (two years for an associate’s degree and four years for a bachelor’s degree). The percentage is taken from all students completing that specific degree requirement. Time to degree is only measured where it is possible given the length of time the high school cohort had postsecondary access.

Table 2. Postsecondary Credentials by Type, 2012 High School Cohort

	Certificate	Associate’s Degree	Normal Completion Timeframe for AA	Bachelor’s Degree
Texas				
0CTE+	2%	5%	26%	10%
1CTE+	2%	6%	30%	10%
2CTE+	3%	8%	35%	9%
Total	2%	6%	29%	10%

*Note.* 100% of students who gained a bachelor’s degree by 2016 in the 2012 cohort did so in the normal timeframe for that degree type.

- *Certificates:* Advanced Technology Certificates (ATCs), Level 1 Certifications (15-42 SCH), Level 2 Certifications (43-59 SCH), or Level 3 Enhanced Skills Certificates;
- *Associate’s Degrees (AD):* Associate of Arts (AA), Associate of Applied Arts (AAA), Associate of Applied Science (AAS), Associate of Arts in Teaching (AAT), and Associate of Science (AS) degrees, as well as others defined by the institution; and
- *Bachelor’s Degrees (BD):* All forms of Bachelor of Arts (BA) and Bachelor of Science (BS) degrees as well as the Bachelor of Applied Technology (BAT).

The chart report only what credentials have been collected from the time of high school graduation to spring 2016. The 2012 cohort had the most complete information as they had access to four years of postsecondary enrollment (see Table 2). For the 2012 cohort, the largest percentages of credentials were awarded in the form of bachelor’s degrees; 10% of the 2012 cohort gained a BD between 2012-2016. CTE+ provided no advantage to students graduating with a BD across the state. For 2012, two percent of students earned a certificate. Advanced CTE+ students had somewhat higher rates of earning a certificate. Slightly higher proportions of students completed an AA if they had participated in 2CTE+ while in high school. Advanced CTE+ students were more likely than their peers to complete an AA on-time.

## **Policy Recommendations/Implications**

This report include outcomes from four years of high school enrollment (2011-2012 through 2014-2015; four high school cohorts (2012-2015) and four years of postsecondary access (2012-2013 through 2015-2016).

### **CTE Participation**

#### ***High School Enrollment Years***

The report looked at CTE enrollment in high school students for the 2011-2012 school year through to the 2015-2016 school year. Information from student enrollment showed that CTE course-taking was on the rise. The average number of CTE and advanced CTE+ courses grew between 2012 and 2015. Growth occurred across the state.

#### ***High School Graduation Cohorts***

Participation in advanced CTE+ courses was linked to even higher percentages of college-ready diplomas for Texas graduates. These numbers demonstrate that participation in CTE+ (i.e., courses linked to college credit) was positively related to college ready graduation. When broken down by demographics—ethnicity, gender, SES, and program participation (e.g., LEP or special education) Texas has maintained a stable CTE enrollment in low-SES over time, suggesting that Texas has not been able to boost CTE participation with disadvantaged students. Course completion information was collected on CTE and advanced CTE+ credits. Information suggests CTE was correlated with advanced CTE+ but retained high averages even in the 0CTE+ category. CTE averages grew across cohorts and all CTE+ groups. Many students, regardless of connections to college-credit opportunities, were taking CTE content. There were also large increases, overall, in 2015 which may be explained by changes in CTE policy and early rollout of FHSP endorsement plans. Information on DC, ATC, and CTE+ credits suggest most students were gaining their advanced CTE+ course credits from ATC classes rather than more traditionally conceptualized dual credit opportunities. This may suggest an ease of implementation with ATC courses or barriers to dual credit partnerships, courses, or programs.

### **Year-One Transitions**

Advanced CTE+ models are meant to create coherent transitions in the P-16+ pipeline while providing relevant and rigorous technical curriculum to all students. This study tracked year-one transitions for all cohorts, following students one year after the completion of a high school diploma in postsecondary access.

Participation in one or more CTE+ course in high school increased the rate of enrollment in higher education after high school. Across Texas, participation in two or more CTE+ courses increased participation in community college right after high school. These findings suggest that CTE+ participation increased opportunities to transition to higher education after high school. Students in advanced CTE+ were more likely to pursue postsecondary education overall and enroll in university settings. All these results suggest positive influences of CTE+ in year-one transitions—postsecondary access the year after high school graduation. Over half of high school graduates were shown to enroll in higher education within a year. CTE+ participation increased the rate and type of postsecondary enrollment.

### **Higher Education**

#### ***Enrollment***

Each graduating cohort, 2012-2015, was tracked against higher education enrollment, both in the year following high school graduation and over time. Enrollment over time suggests that most students who entered higher education were doing so within a year of high school graduation. Transitional enrollment in higher education for all cohorts ranged from 52-54% across Texas. Cohorts improved postsecondary access over time, though, suggesting up to ten percent of students delayed entrance into higher education. Within each cohort, students who participated in advanced CTE+ (2CTE+) had greater proportional enrollment in higher education. Texas showed higher enrollment in community colleges within each cohort. Advanced CTE+ students were more likely to enroll at the community college across Texas. Advanced CTE+ also advantaged public university enrollment as well. As all cohorts had similar transitional enrollment, these numbers indicate that more 2CTE+ students enrolled in (perhaps even transferring up to) public universities over time.

## Postsecondary Attainment

Postsecondary attainment was calculated as the percent of students who graduated high school and then went on to gain a higher education degree. Higher education graduation was tracked by year, and by the type of credential received: certificate, associate's degree, or bachelor's degree. Results suggest that even though the majority of high school students enrolled in some form of higher education, few completed a postsecondary credential. Less than a fourth of students in the 2012 cohort gained a postsecondary credential within four years. Across the state, CTE+ may have provided a slight advantage in completing a postsecondary credential as well (19% for 2CTE+ compared to 17% overall). Numbers were the largest for the 2012 cohort as they had four years of postsecondary access. Other years displayed similar trends but had less enrollment and completion information. Advanced CTE+ impacted higher education graduation. Students who participated in two or more CTE+ courses in high school had higher rates of postsecondary attainment across the state. Greater proportions of students who participated in advanced CTE+ completed a certificate credential. The numbers suggest that participation in advanced CTE+ programs is improving postsecondary attainment and success. Growth in all forms of higher education credentials show that participation in CTE+ has long-term and widespread benefits.

## Implications

A breakdown of results points to areas of particular success, particularly in the efforts of advanced CTE+ programs. High school enrollment information showed more students were taking CTE, and growing numbers of students were taking advantage of CTE+ courses and programs. Transition outcomes one year after high school showed participation in one or more CTE+ course improved the rate of enrollment in higher education. Enrollment over time showed CTE+ improved the odds of entering higher education. Advanced CTE+ was positively associated with earning a certificate, associate's degree, and bachelor's degree. Short and long term outcomes suggest great efficacy in CTE+ and continued growth in participation in CTE. P-16+ results show that participation in CTE+ has lasting impacts. As calls for CTE reform and growth continue due to policy shifts and legislative changes, these results may better direct further reform and new projects.

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