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College and Work after High School for Tennessee Career and Technical Education Students

Celeste Carruthers

University of Tennessee, Knoxville, carruthers@utk.edu

Jonathon Attridge

Tennessee Department of Education, Jonathon.Attridge@tn.gov

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Recommended Citation

Carruthers, Celeste and Attridge, Jonathon, "College and Work after High School for Tennessee Career and Technical Education Students" (2019). *Georgia Policy Labs Reports*. 1.

doi: <https://doi.org/10.57709/30728950>

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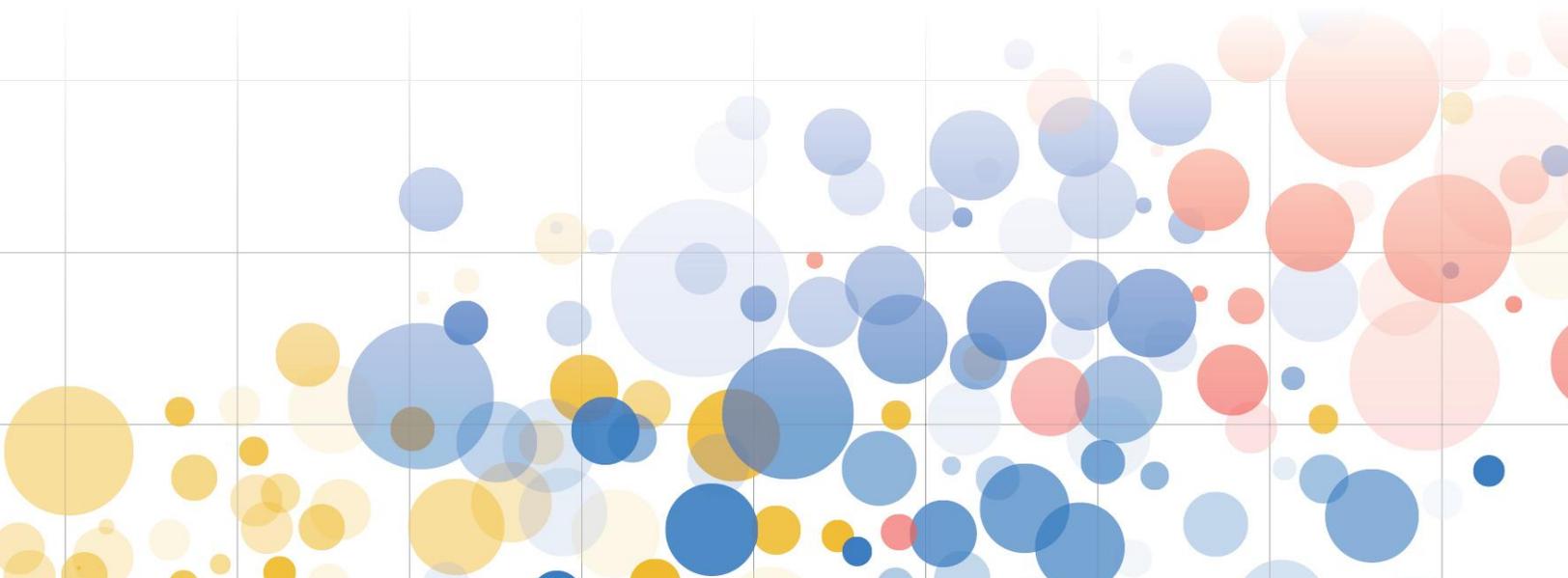
Career and Technical Education Policy Exchange

College and Work after High School for Tennessee Career and Technical Education Students

May 2019

Celeste K. Carruthers
University of Tennessee

Jonathon Attridge
Tennessee Dept. of Education



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HIGHLIGHTS

- About 47 percent of Tennessee high school graduates are Career and Technical Education (CTE) concentrators, and this percentage has been rising over time.
- CTE concentrators are as likely as non-concentrators to enroll in college after high school, although they were less likely to do so prior to Tennessee Promise.
- CTE concentrators are more likely than non-concentrators to enroll in a technical or community college and less likely to enroll in a four-year college or university.
- Among graduates who did not go to college, CTE concentrators had higher earnings one to six years after high school, and they were more likely to work in two of the state's high-need areas: manufacturing and health.
- Regardless of CTE background, graduates who did not go on to college had fairly low earnings (\$18,000-21,000 after six years) and were most likely to work in food and accommodation services, administrative support services and retail

MOTIVATION

Education is essential to creating opportunity and upward mobility. Throughout the 20th century the United States led the world in its expansion of universal education, a time described as a race between education and technology (Goldin and Katz, 2009). In more recent years, however, many worry that technology has caught up to and surpassed much of the skill base, resulting in a polarized labor market and shutting less skilled workers out of well-paying jobs (Selingo, 2018).

These concerns have revived policy interest in K-12 Career and Technical Education (CTE). Perhaps, the thinking goes, the skills gap feared by employers and policymakers can be addressed by offering K-12 students a menu of programs and pathways that includes college preparation *and* technical skills aligned to well-defined careers. Today's CTE encompasses much more than "shop class," i.e., training for technical trades, with programs of study in business, information technology, and health sciences, among many other fields. The majority of high school students touch at least one CTE course, broadly defined. In

Tennessee, Governor Bill Lee's very first legislative initiative upon taking office in January 2019 was to expand CTE, motivated by the idea that "[i]t is time to make sure education in Tennessee embraces multiple pathways to success" (quoted in Gonzales, 2019).

Does CTE create opportunities for students that school systems cannot fulfill otherwise? Existing research on this question is thin. Federal law as well as state and local education agencies are investing in new and expanded CTE models without a clear understanding of whether and how career-focused education translates into success in the labor market.

This report is an early contribution to the work of the Career and Technical Education Policy Exchange (CTEx) at Georgia State University. CTEx is a partnership between state education agencies and academic researchers in Tennessee, Michigan, Massachusetts, and Rhode Island. The overarching goal of this research lab is to build up the foundation of research on career and technical education in public schools to inform policy and

practice related to CTE. As a starting point, the CTE Tennessee team took a close look at the college and career outcomes of CTE concentrators from the graduating classes of 2010-16. Some of the statistics to follow can be found in earlier state reports, and some are new to the discussion.

TENNESSEE'S CTE DATAHUB

In support of this work, we created a CTE “DataHub” merging K-12 administrative data from the Tennessee Department of Education, postsecondary data from the Tennessee Higher Education Commission (THEC), and workforce outcomes from the Tennessee Department of Labor and Workforce Development (TLWD). The DataHub resides in the secure Tennessee Longitudinal Student Data System (TLDS) environment, is accessible to CTE Tennessee researchers, and can be made available to external researchers if they are approved through TLDS governance protocols. In addition to K-12, postsecondary, and workforce data, the DataHub will soon include information on students’ industry certification.

WORK AND COLLEGE OUTCOMES FOR CTE CONCENTRATORS

According to the reauthorized Perkins Act, the federal definition of a CTE concentrator is one who has completed two or more courses in a single CTE program of study. Joining many other states, Tennessee’s internal definition of a concentrator is narrower, identifying students who have completed three or more credits in a single program of study.

In Tennessee, there are currently 58 distinct programs of study, a number which has fallen from over 200 in 2012-13 as programs were re-

organized or retired. Programs of study are groups or sequences of classes that build specialized skills. Programs of study are grouped into 16 career clusters that cover almost any industry or occupation where one might eventually work. “Audio/Visual Production,” for example, is a program of study in the “Arts, Audio/Visual Technology, and Communications” career cluster, and “Welding” is a program of study in the “Architecture & Construction” cluster.¹ Career clusters include between one and six different programs of study. Currently, each program of study is associated with just one career cluster.



¹ Tennessee CTE career clusters include: Advanced Manufacturing; Agriculture, Food, & Natural Resources; Architecture & Construction; Arts, Audio/Visual Technology, & Communications; Business Management & Administration; Education & Training; Finance; Government & Public Administration; Health Science; Hospitality & Tourism; Human Services; Information Technology; Law, Public Safety, Corrections, & Security; Marketing, Distribution, & Logistics; STEM; and Transportation. A complete crosswalk of programs of study to career clusters is available here: www.tn.gov/content/dam/tn/education/ccte/cte/cte_pos_2018-19.pdf.

K-12 administrative data on all 2010-16 graduates include an indicator for students who met the state's definition of a CTE concentrator for that cohort. Generally, these would be students who completed three courses in a program of study. Importantly, these students are primarily identified as concentrators by school faculty and staff, and not course enrollment records. In our ongoing work on this topic, we are cross-checking these reported measures of concentration against course histories.

Figure 1. The percent of graduates with a CTE concentration has been rising over time

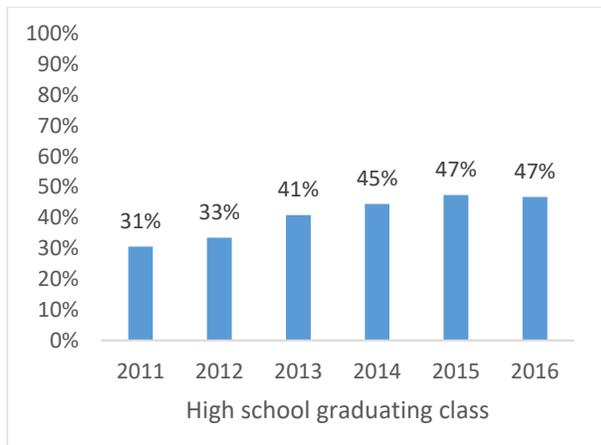


Figure 1 plots the percent of high school graduates marked as CTE concentrators (vertical axis) by graduating class (horizontal axis), showing that just under half of the most recent graduates are CTE concentrators, and that this percentage has been rising other time. Figure 2 examines the gender breakdown of CTE students by separating graduating classes into males and females and then tracing the percent of each gender who were CTE concentrators across cohorts. Results show that CTE in Tennessee is not male- or female-dominated. Among male 2016 graduates, 47 percent were CTE concentrators, and among female 2016 graduates, 46 percent were CTE concentrators. Females were slightly better represented than males

among CTE concentrators in some years, but as far back as the 2011 graduating cohort, they have been almost or as likely as males to concentrate in CTE.

Figure 2. Males are as likely as females to concentrate in CTE

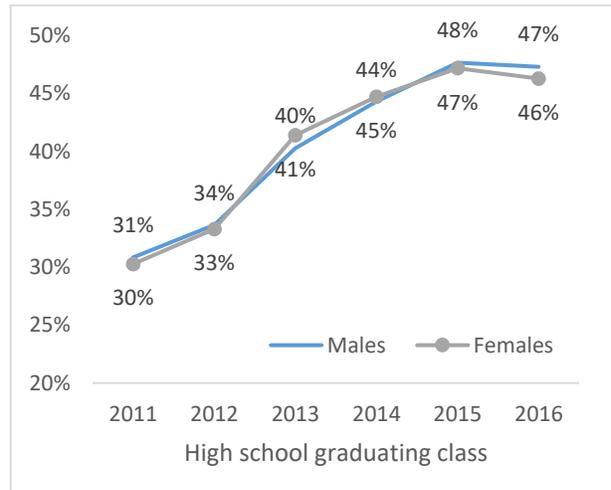


Figure 3. Under-represented minority students are less likely to concentrate in CTE

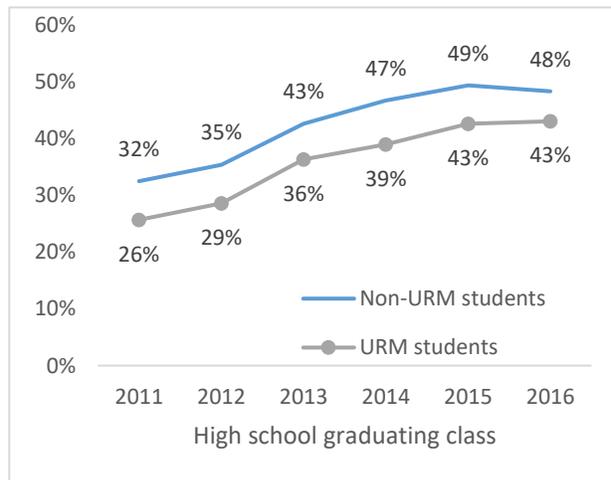


Figure 3 plots the percent of graduates who are CTE concentrators separately for under-represented minority (URM) students and others. Consistent with state reports, underrepresented minorities are defined as black, Hispanic, and Native American students. Among the most recent cohorts, URM graduates were 10 percent (5 percentage points) less likely to concentrate in a CTE program of study

than other students, although this gap has narrowed somewhat over time.

How do CTE students compare to others in terms of college enrollment? Figures 4-8 plot various postsecondary college enrollment percentages (vertical axis) by graduating class (horizontal axis). Consistent with a recent state report that also summarized graduates' postsecondary enrollment,³ these statistics are limited to regular diploma recipients.

Unlike reports and statistics reported under state accountability business rules, however, we summarize enrollment within a full year of high school graduation, and not just the fall term following high school graduation. Enrollment statistics in the figures to follow tend to be 1-2 percentage points higher than they are in comparable state reports because of this difference. Proportionately, this makes the most difference with enrollment in Tennessee Colleges of Applied Technology (TCATs), where a number of students start in the spring rather than the fall.

Figure 4 shows that college enrollment within a year of high school hovered around 60-61 percent until the class of 2015, when college-going jumped to 64-65 percent. This is likely attributable to Tennessee Promise, which started providing tuition-free community college with that cohort (Smith, 2015).⁴

³ The Tennessee Department of Education report, "Drive to 55: Pathways to Postsecondary," is available here: www.tn.gov/content/dam/tn/education/ccte/ccte_drive_to_55_report_state.pdf. Each year, a small number of students enroll in two or more different institutions immediately after high school. Those who enrolled in both a four-year college or university and a two-year community or technical college are counted only toward four-year enrollment percentages. Those who enrolled in both a community college and technical college are counted only toward community college enrollment percentages.

⁴ Linked within the Smith (2015) article is this fact sheet provided by THEC:

Figure 4. The percent of graduates enrolling in college within a year of high school increased in 2015 with the first class eligible for Tennessee Promise

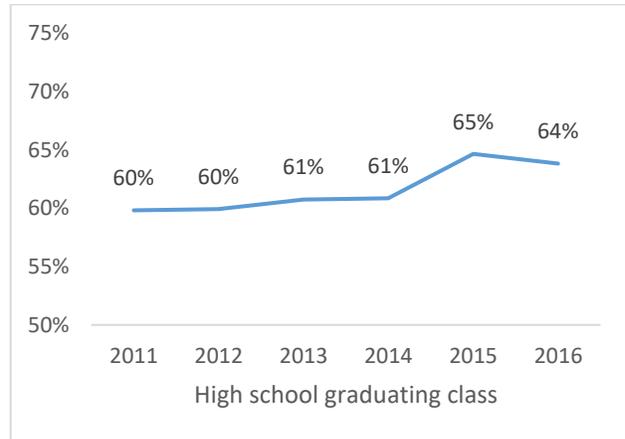


Figure 5. The gap in college enrollment between CTE concentrators and other students has closed .

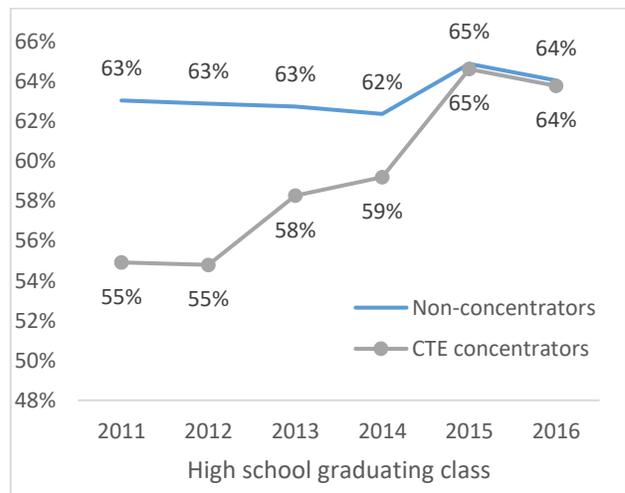
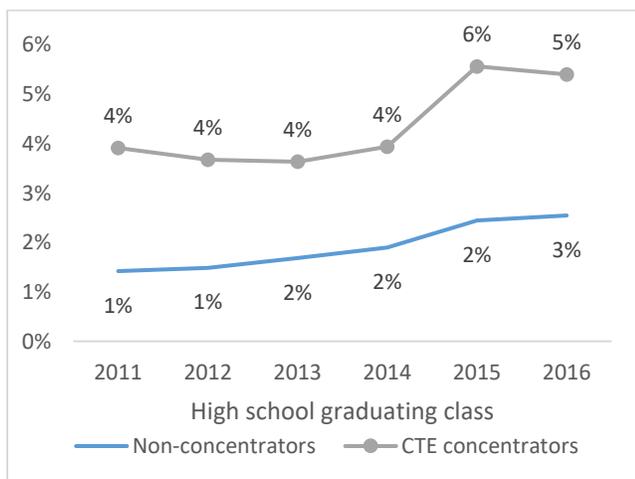


Figure 5 shows that there has been a sizable but narrowing gap in college enrollment between CTE concentrators and non-concentrators. That gap completely closed with the 2015 cohort. It is possible that Tennessee Promise's focus on community colleges, which tend to offer more career-oriented programs than four-year colleges and universities, was most effective at changing the college choices of CTE students.

www.insidehighered.com/sites/default/server_files/files/TNPromiseYear1Numbers.pdf.

Figures 6, 7, and 8 dive further into the college going behavior of CTE concentrators and non-concentrators, breaking down enrollment by type of college. Figure 6 shows that while relatively few high school graduates go straight to a TCAT (just 3 percent of all graduates), CTE concentrators are more likely than non-concentrators to do so, and that this gap has grown since the start of Tennessee Promise in 2015. Similarly, Figure 7 documents a widening gap in community college enrollment between concentrators and non-concentrators, although the overall volume of community college enrollment is considerably larger than what we see for TCAT enrollment.

Figure 6. CTE concentrators are more likely to enroll in a TCAT within one year of high school



Since TCATs and community colleges offer more career-focused and technical programs than four-year colleges and universities, it is not surprising that concentrators are less likely than non-concentrators to enroll in a four-year school. Figure 8 shows that the gap in four-year enrollment has narrowed since 2011, but that concentrators are still 18 percent (7 percentage points) less likely to go on to a four-year school than non-concentrators. Notably, Figures 6-8 also depict substitution in favor of two-year

enrollment over four-year enrollment among both concentrators and non-concentrators following Tennessee Promise. While college going increased overall, there was a discernible shift toward two-year institutions where Promise funds could be applied.

Figure 7. CTE concentrators are more likely to enroll in a community college within one year of high school

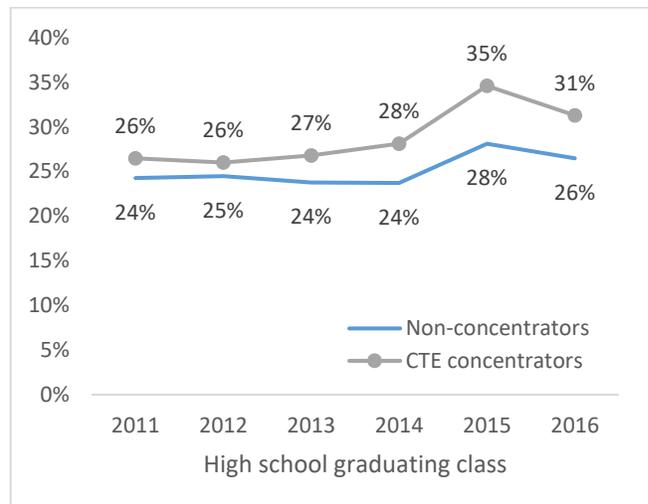
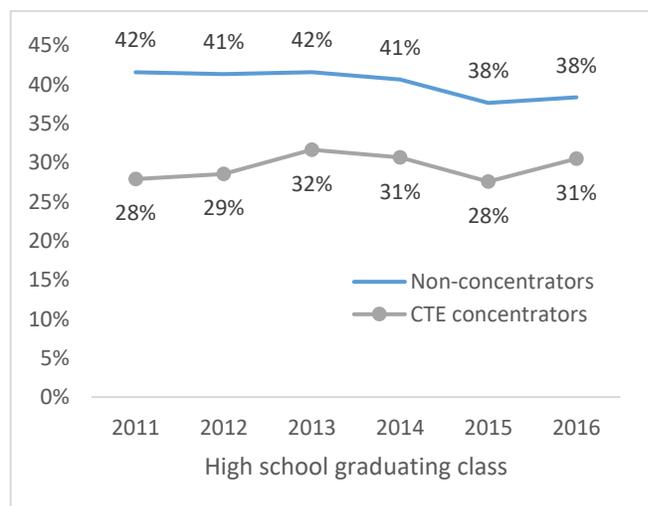


Figure 8. CTE concentrators are less likely to enroll in a four-year college within one year of high school



Figures 9 and 10 focus on 2011-2016 graduates who did not enroll in college within a year of high school and reports their likelihood of having any Tennessee earnings covered by Unemployment Insurance (Figure 9) and average UI-covered

earnings in the fiscal year following the spring of their graduation year (Figure 10). UI-covered employees include those eligible for Federal-State Unemployment Insurance benefits administered by Tennessee. This excludes work in other states, the military, federal agencies, some agricultural occupations, self employment, or independent contract arrangements.

Graduates who do not move seamlessly into college are typically found in UI-covered work, as depicted by Figure 9, although this percentage has been declining for unclear reasons. One possibility is that employment in work not eligible for Unemployment Insurance is becoming more common among high school graduates as well as the broader population. We cannot tell from the available data if unemployment or UI exclusions are driving the downward trend shown in Figure 9.

Figure 9. Among students who do not go to college, CTE concentrators are more likely to have UI-covered earnings one year after high school

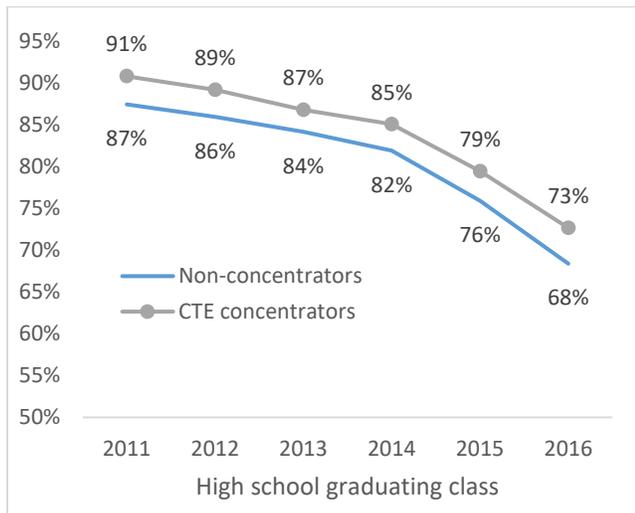
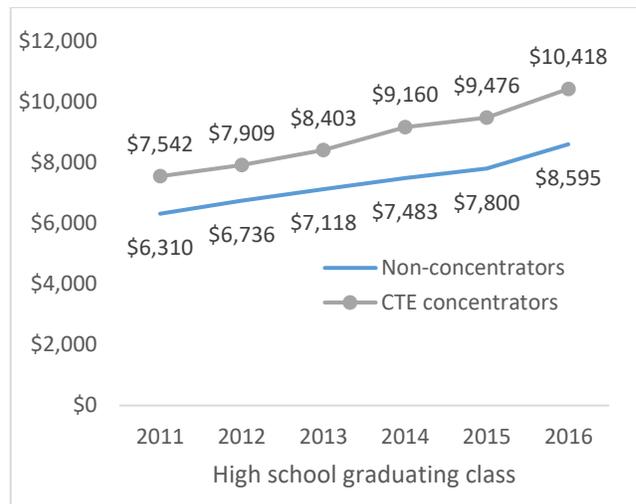


Figure 10. Among graduates who do not go to college, CTE concentrators have higher UI-covered earnings one year after high school



Regardless of the source of this decline, it accelerated following Tennessee Promise. Just 68-73 percent of 2016 graduates went to UI-covered work if they did not go to college, versus 82-85 percent of 2014 graduates immediately prior to Tennessee Promise. This pattern could be explained by the type of student who would be on the fence about going to college at all and who would be responsive to Tennessee Promise. That type of student may have employment opportunities that compete with the idea of going to college. If free community college sways such students toward enrolling rather than working, the graduates who are left to populate Figure 9 would be those who typically have fewer employment opportunities. That is to say, Tennessee Promise could have changed the composition of students who go to work rather than college, drawing work-oriented students toward college.

Figure 10 plots total UI-covered earnings one year after high school for students who did not enroll in college and who were found with UI-covered employment. We define the year after high school as the last two quarters of the calendar year when a student graduated (or the last two quarters of the following year for December graduates) plus the first

two quarters of the next year. Earnings in Figure 10 are adjusted for inflation using the Consumer Price Index.

The trend in earnings for graduates who went to work and not college has been rising, which is consistent with the broader economic recovery following the Great Recession. Notably, and unlike post-graduation figures up to this point, there is no sharp change in earnings coincident with Tennessee Promise. Even if Promise changed the volume and composition of graduates going to work rather than college, it did not appear to register as large of a difference in their earnings.

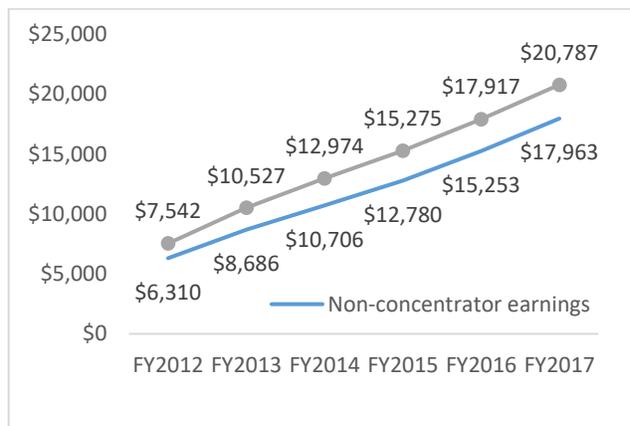
The most important insight from Figure 10 is that earnings are typically low for students who go straight to work rather than college, regardless of their background in CTE. Workers from the class of 2016 earned \$9,508 on average in the year after graduation. This is less than the federal poverty level for a one-person household. CTE concentrators earned somewhat more than non-concentrators in the year following high school: \$10,418 versus \$8,595 for the class of 2016.

It is possible that it takes time for recent graduates to secure well-paying jobs, in which case the low earnings presented in Figure 10 are temporary. With this in mind, Figure 11 focuses on the graduating class of 2010-11 who did not seamlessly enroll in college and traces their earnings one to six fiscal years after high school graduation, by CTE concentrator status. As in Figure 10, annual earnings are adjusted for inflation and measured from the third quarter of one calendar year through the second quarter of the next.

Figure 11 shows that earnings for CTE concentrators and non-concentrators from the class of 2011 steadily rose throughout the ensuing six years, reaching \$20,787 per year for concentrators and \$17,963 for non-concentrators. Concentrator

earnings were consistently higher than non-concentrator earnings each year following high school. The gap favoring concentrators widened over time: Concentrators earned \$1,231 more than non-concentrators in the first year after high school, versus \$2,823 more in the sixth year after high school.

Figure 11. For 2011 graduates who did not go to college, CTE concentrators consistently earned more than non-concentrators 1-6 years after high school



Earnings data from the state's UI system also allow us to observe a limited amount of information about graduates' employers and industries. Specifically, we see a unique and anonymous marker for each employer as well as that employer's industry code (NAICS). We group industry codes into sectors according to Bureau of Labor Statistics definitions.⁵ For 2015 graduates who went to work and did not seamlessly enroll in college, we focus on the two fiscal years following high school and compute their number of unique employers, number of unique industry sectors, and the incidence of employment in any given sector. Table 1 lists average values of these statistics, separately for CTE concentrators and non-concentrators.

⁵ See www.bls.gov/iag/tgs/iag_index_naics.htm.

Table 1. Employers and Industries within two years of high school for 2014 graduates who did not go to college

	Non-concentrators	CTE concentrators
Number of industries within two years of high school	2.3	2.3
Number of employers within two years of high school	3.6	3.4
Most common industries of employment		
Food and accommodation services	54%	46%
Administrative support services	50%	47%
Retail	44%	44%
Manufacturing	16%	21%
Transportation	15%	13%
Health	10%	13%
Professional services	9%	6%
Other services	5%	6%
Construction	7%	10%
Wholesale	4%	6%

Table notes: Industry sectors are determined by employers' NAICS code in Unemployment Insurance records and grouped according to Bureau of Labor Statistics definitions (www.bls.gov/iag/tgs/iag_index_naics.htm). Percentages add up to more than 100 percent because graduates were typically employed in multiple industries. Fewer than 1 percent of 2014 graduates were employed in each of the following industries omitted from this table: agriculture, forestry, mining, utilities, or management. Between 1 and 5 percent of graduates were employed in information, finance, real estate, education, arts, or government.

Regardless of CTE concentration, 2015 graduates not in college typically worked in two to three different industry sectors and worked for three to four different employers over the two years following high school. The most common industries of employment were food and accommodation services, administrative support services (which includes firms providing temporary employment services and support services such as security, waste management, customer relations, and clerical), and retail. Each of these top three industries employ 44-54 percent of graduates at least once,⁶ although that tendency was somewhat less likely for CTE concentrators. CTE concentrators were somewhat

more likely to work in manufacturing (21 percent) and health (13 percent), which correspond to high-need areas identified by the state.

⁶ In results not shown, we find that almost 9 in 10 graduates who do not go straight to college work in retail, food and accommodation services, or support services at least once within two years of high school.

NEXT STEPS

The CTE Tennessee’s team ongoing work is organized around three questions.

How do different measures of CTE concentration compare in Tennessee state data systems?

The state currently relies on faculty and staff in schools to mark students as CTE concentrators in a dedicated CTE data system. These data are then transferred to TDOE and merged with other K-12 administrative records. We are cross-checking staff reported indicators of CTE concentration with students’ course enrollment histories. This will inform the state on the accuracy of the current practice of identifying CTE concentrators and provide an early look at the federal Perkins Act’s two-course definition of concentration.

Are Perkins Act measures of CTE program quality associated with postsecondary college and career progression?

Reauthorization of the Perkins Act (“Perkins V”) was signed into law July 31, 2018. Two of the key provisions are as follows:

- Shifting responsibility to states to determine their performance measures, including new program quality measures, and related levels of performance to optimize outcomes for students
- Introducing a needs assessment to align CTE programs to locally identified in-demand, high-growth, and high-wage career fields

States will submit four-year plans that include proposed performance measures in the spring of 2020. In support of Tennessee’s planning and local needs assessments, we will use data described here to (1) describe the state’s CTE programs of study according to federally defined “program quality

indicators” (industry certification, postsecondary credits, and postsecondary credentials earned by concentrators), and (2) assess the degree to which those indicators relate to college and workforce outcomes summarized in this brief.

Why do students select into CTE, and into particular CTE programs of study?

A key challenge in studying the effect of CTE on student success in and after high school is the idea that students with an unobserved predisposition toward college enrollment or work in a particular field will also tend to select coursework that suits those outcomes. CTE is not randomly assigned to students, and much of our research on the effect of CTE will necessarily be non-experimental. We showed here, for example, that among graduates who did not go to college, CTE concentrators earned more than non-concentrators. Is that because their CTE coursework gave them an edge in the workforce? Or, would the type of student who sticks with a CTE program of study have that edge regardless?

Before we begin to understand how CTE affects students after high school, we need to understand why students select CTE in the first place. Toward this end, we are exploring the effects of three types of external stimuli on the likelihood of CTE concentration, and on the type of CTE program one chooses: regional changes to industry and labor needs, the announcement of high-need areas for workers in advanced manufacturing, health, and information technology, and student achievement measures early in high school.

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ABOUT THE AUTHORS

Jonathon Attridge, a research manager at the Tennessee Department of Education, leads the department's research work in evaluating high school policies and programs that lead to postsecondary and workforce success. His work identifies policies and practices to increase postsecondary enrollment and completion through research-practice partnerships with external researchers and an internal research team. He serves on the steering committee for Tennessee's Longitudinal Data System, P20 Connect TN, and manages the research as part of the department's Institute for Education Science's Statewide Longitudinal Data System grant. As co-PI of CTEX's Tennessee work, he ensures that the research aligns with and informs state policy decisions around career and technical education. Jonathon anticipates completing his PhD in Leadership and Policy Studies from Peabody College at Vanderbilt University in fall 2019.

Celeste Carruthers is an associate professor in the Haslam College of Business at the University of Tennessee with a joint appointment in the Department of Economics and the Boyd Center for Business and Economic Research. Her research centers on education policy with crossovers into public economics, labor economics, and economic history. Recent and ongoing projects examine the effect of financial aid on college choices, career and technical education, and the consequences of segregated schools in the early 20th-century United States. She teaches graduate and undergraduate courses in regulation and public expenditure analysis. Carruthers is a co-editor of *Economics of Education Review*, a former member of the Association for Education Finance and Policy Board of Directors, a member of the CTE Research Network at the American Institutes for Research, an affiliated researcher with the National Center for Analysis of Longitudinal Data in Education Research (CALDER), and she has served as a faculty advisor to several fellows in the Harvard Graduate School of Education Strategic Data Project. Before arriving at UT in 2009, Carruthers earned a Ph.D. in economics from the University of Florida, an M.A. in economics from the University of New Hampshire, and a bachelor's degree in economics and accounting from Appalachian State University.

ABOUT THE GEORGIA POLICY LABS

The Georgia Policy Labs (GPL) is a collaboration between Georgia State University and a variety of government agencies to promote evidence-based policy development and implementation. Housed in the Andrew Young School of Policy Studies, GPL works to create an environment where policymakers have the information and tools available to improve the effectiveness of existing government policies and programs, try out new ideas for addressing pressing issues, and decide what new initiatives are promising enough to scale up. The ultimate goal is to help government entities more effectively use scarce resources and make a positive difference in people's lives. GPL contains three focus areas: The Metro Atlanta Policy Lab for Education works to improve K-12 educational outcomes in metro Atlanta; the Career and Technical Education Exchange focuses on high-school-based career and technical education in multiple U.S. states; and the Child and Family Lab looks at issues of the whole child and whole family with Georgia's state agencies. In addition to conducting evidence-based policy research, GPL will serve as a teaching and learning resource for state officials and policymakers, students, and other constituents. See more at gpl.gsu.edu.