

News from the CTE Research Network:

What are we learning about the impact of CTE for students?

By Katherine Hughes

Does career and technical education (CTE) benefit students? That question lies at the heart of the work of the CTE Research Network, now in its fourth year, to expand the evidence base on CTE's impact.

Recognizing the need for more causal research on CTE, the Institute of Education Sciences, the nonpartisan research arm of the U.S. Department of Education, funded the Network in 2018. Since then, the Network has grown to include six studies and dozens of researchers and advisors. All studies use causal methods to determine whether CTE participation caused students to have different outcomes than if they had not participated.

Why is causal research important?

Until recently, almost all CTE studies were descriptive or correlational. For example, researchers described what they saw in the field, collected data via surveys, tracked trends in student enrollment across different career clusters, and measured student outcomes like CTE program completion, high school graduation, and postsecondary enrollment. Researchers also used quantitative methods to establish correlations; several studies showed that enrollment in high school CTE courses is associated with a lower likelihood of dropout and a higher chance of graduation on time.

These studies and findings are noteworthy, and all contribute to our understanding of CTE. But they don't tell us whether CTE directly produced student outcomes. Only with causal methods — such as randomized controlled trials

and other approaches that use control groups — can we tell whether particular outcomes are due to CTE.

The six studies being conducted by the CTE Research Network examine a range of CTE models including the Connecticut Technical High School System; STEM-focused schools called P-TECH where students can earn both a high school diploma and an associate degree; North Carolina's CTE dual enrollment program; the multitude of CTE offerings in the New York City (NYC) school district; two types of technology-based advising tools; and the Virtual Enterprises (VE) program in use in more than 400 schools across the country.

What are we learning from these Network studies? Although some of them are still in their early stages, here's what we know so far.

Evidence from the Connecticut Technical High School System

Connecticut technical high schools are located throughout the state, and all Connecticut students may apply to attend them. Overall, the schools serve a significant number of students who are eligible for free and reduced-price lunches. In grade nine, students explore different programs of interest, and in grade 10, they are assigned a program based on preference and availability. Students then spend the next three years with a stable group of peers and instructors in their programs. All students take CTE coursework in lieu of other electives, and the schools tend to offer at least 10 programs of study.

Results

- Male students attending Connecticut technical high schools had improved attendance rates and test scores. They also saw large gains in high school graduation rates and post-graduation earnings (Figure 1).
- There were no significant effects of attending the schools for female students.

Overview of CTHSS

16 technical high schools
at the time of the study



8% of Connecticut high schoolers
enrolled in CTHSS schools



Key findings

Attending a CTHSS school paid off with large gains for male students²

compared to similar students who applied to CTHSS but attended other schools.



Better grade 9
attendance rates



Better grade 10
test scores



Higher high school
graduation rates



Higher post-graduation
**quarterly earnings at
age 23 or older**

FIGURE 1

Cumulative credits earned after three years of high school

	Comparison Students	P-TECH Students
Total credits	31.6	33.6
CTE and other extra credits	4.4	7.3

Note: In the New York City Department of Education administrative records, 1 credit = 1 semester.

FIGURE 2: P-TECH RESULTS

Findings from the P-TECH impact & implementation study

The distinguishing feature of the Pathways in Technology Early College High School (P-TECH) model for grades nine through 14 is a partnership. P-TECH brings together a high school, a local community college, and one or more employers to prepare students for both college and careers — not one or the other — within six years. The model was originally developed by the New York City Department of Education, the City University of New York (CUNY), and IBM, with the first school opened in Brooklyn, New York, in 2011. Additional schools followed in NYC and elsewhere; this study focuses on the first seven schools in New York City.

During the six-year P-TECH program, employer partners provide students with work-based learning experiences, such as internships, mentoring and workplace visits. CTE courses teach specific workplace skills aligned with labor market needs and employability skills, such as good work habits. High school coursework is accelerated so that college coursework can begin as early as 10th grade, and students may earn a cost-free associate degree.

The evaluation of North Carolina's Career & College Promise program's CTE pathway

North Carolina's Career and College Promise is a statewide dual enrollment program that includes a CTE pathway. This pathway offers several sequences of CTE-focused college courses that lead to a technical credential or a workforce major at a postsecondary institution. Students can enroll at participating state community colleges during grades 11 and 12, with no cost for tuition. Nine percent of all North Carolina students in grade 12 participated in the CTE dual enrollment pathway in 2018–19.

While a large body of research shows positive benefits for dual enrollment students, there is limited research on the impact of taking CTE-specific dual enrollment courses. This study draws on statewide data from North Carolina high school students who participated in Career and College Promise during the 2012–13 to 2022–23 school years and examines the implementation, impact, and cost of the program.

Career and College Promise Results

- Students participating in the Career and College Promise CTE pathway were more likely to graduate from high school (Figure 3).
- CTE dual enrollment students earned an average of 5.8 college CTE credits compared to no credits for the comparison group.
- There was also a significant positive impact (10 percentage points) on enrollment in a NC community college within one year of high school graduation, and a 9% impact on enrolling in any North Carolina public postsecondary institution.
- For some outcomes, CTE dual enrollment students from underrepresented racial/ethnic groups and/or under-resourced communities benefited more from program participation compared to their more well-represented and better resourced peers.

P-TECH Results

- After three years of high school, P-TECH students had earned two more overall credits (Figure 2) than students in comparison schools.
- More P-TECH students passed the Regents Examination in English Language Arts with a score that qualified them to take CUNY college courses.




	More COLLEGE CREDITS earned while in high school	6x more
	More likely to GRADUATE from high school	2+ percentage points higher
	More likely to ENROLL in college ²	9+ percentage points higher

FIGURE 3: CAREER AND COLLEGE PROMISE RESULTS

Looking ahead

The Network's findings thus far show positive impacts — on high school milestones, graduation, enrollment in post-secondary institutions, and post-high school earnings — for students participating in CTE-focused high schools and programs. These results fall in line with some previous studies, so we are building an evidence base that increasingly shows promise for CTE.

Our six studies are ongoing, and in the next year, we will have additional findings regarding:

- The cost effectiveness of high-quality CTE
- Whether students in some career clusters benefit more than students in others
- How the programs affect participating students with disabilities

We welcome your reactions to and interpretations of our studies' initial findings. For example, the Connecticut study found positive effects but only for participating male students. Do you think this is the case for the students in your CTE programs? Both the Connecticut and North Carolina studies found higher high school graduation rates for CTE students. Are you seeing the same

in your high schools? If yes, why do you think this is the case?

ACTE and its members are critical to not just understanding research findings but also to setting an agenda for future CTE research. We would be happy to hear from you. Visit our website to leave us a comment and learn more about our studies. While you're there, browse our series of free self-guided training modules designed to strengthen the capacity of practitioners in the field to use, share and conduct their own CTE research. ■

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five-year initiative funded by the Institute of Education Sciences, U.S. Department of Education, that aims to expand the evidence base for CTE. She is also a member of the senior AIR team conducting the National Evaluation of CTE under Perkins V (NECTEP), the Congressionally mandated study of the implementation of the Perkins V legislation. She is a co-author of the book *Working Knowledge: Work-based Learning and Education Reform*.

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RESEARCH

Causal Impact of Attending a Career-Technical High School on Student Achievement, High School Graduation and College Enrollment

Vanderbilt University and the University of Connecticut
Study period: Nine years (2016–2025)

The research team works with the Connecticut Technical Education and Career System (formerly known as CTHSS), the quasi-independent public school district of choice that comprises 16 high schools where all students take CTE coursework in lieu of other electives. Using an application process that scores students and admits them in descending order, the research team estimated the causal effects to deepen understanding of the programs' impacts and to inform state and local policy related to CTE funding and program availability.

P-TECH 9-14 Schools: An Impact, Implementation and Cost Study

MDRC
Study period: Five years (2017–2022)

MDRC researchers use an experimental design to assess the implementation, impact and cost of the first seven P-TECH schools to open in New York City. The research team is using the NYC-wide lottery-based high school choice process to identify two sets of comparable students: those who randomly won the opportunity to attend one of the seven NYC P-TECH schools, and those who were randomly placed elsewhere.

Assessing the Implementation, Impact and Variation of CTE Innovation: NYC as a Lab for Rigorous CTE Research

New York University, Vanderbilt University, and MDRC
Study period: Four years (2017–2021)

Researchers are assessing the impact of NYC's CTE programs on students' career and work-related learning experiences, social and behavioral competencies, high school graduation rates, and transitions to college and the workforce. The project is examining variation across more than 200 of NYC's CTE programs to identify factors associated with positive impacts.

The Evaluation of Career and College Promise

University of North Carolina at Greensboro and RAND Corporation
Study period: Five years (2019–2024)

Career and College Promise allows high school students in North Carolina to earn college credit through three pathways: college transfer, CTE and cooperative innovative high schools, such as early colleges. The CTE pathway provides access to dual enrollment courses for students to earn a certificate or diploma aligned with a career cluster. The research team uses a quasi-experimental design that matches participating students to nonparticipating students, examining impacts at the high school, postsecondary and workforce levels for different subgroups of students. For the CTE pathway, the project will also examine the impact of taking courses that fall into different career clusters.

Choice and Information: The Impact of Technology-based Career Advising Tools on High School Students' CTE Choices and Academic Performance

MDRC
Study period: 5 years (2020–25)

Career advising tools provide an option for helping students identify careers of interest, make choices and pursue CTE opportunities in high school. This study uses a randomized controlled trial design to test the efficacy of two technology-based career advising tools: Xello and YouScience. The study seeks to understand whether and how these tools influence student thinking about career options, choice of relevant CTE coursework and work-based learning options, and decisions about CTE concentration in available pathways and programs of study.

An Experimental Evaluation of the Efficacy of Virtual Enterprises

RAND Corporation and the American Institutes for Research
Study period: 5 years (2021–26)

Incorporating work-based learning into the curriculum as part of a CTE program may improve students' readiness for college and careers. This randomized controlled trial will provide the first causal evidence on the efficacy and cost-effectiveness of virtual enterprises, a yearlong course in which students operate a virtual firm and participate in a virtual economy with other VE firms.

Techniques

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