Annenberg Institute
BROWN UNIVERSITY

EdWorkingPaper No. 25-1329

Running a Business in High School: Selection into the Virtual Enterprises Program

Tiffany Berglund
RAND Corporation

Lindsay Daugherty
RAND Corporation

Katherine Hughes
EdWordian, LLC

Umut Özek
RAND Corporation

Nazia Wolters
RAND Corporation

To better prepare high school students for the workforce, many schools and districts are building career and technical education coursework that provides students with the opportunity to deeply engage in work-based learning. Virtual Enterprises (VE) is a program where students open school-based enterprises, hold positions in the company (e.g., Chief Executive Officer, Marketing Director), sell products on a virtual market with other participating schools, and engage in regional and national competitions. We first examine how schools enroll students in VE courses, drawing on a survey of VE teachers across the country and interviews with school staff in two districts. We find that some schools have selective processes to determine which students will participate, and VE programs in Kern High School District and New York City Public Schools are more likely to be selective than programs nationally. We leverage historical administrative data from Kern High School District and New York City Public Schools to examine the characteristics of students who participate in Virtual Enterprises. We find that VE-takers have significantly higher prior test scores, have lower prior absences and disciplinary incidents, and are significantly less likely to be identified as English learners and special education students. Prior course-taking patterns also differ for VE-takers. The differences in characteristics of VE-takers cannot be fully explained by sorting into schools or pathways. Survey data from six schools across the two districts indicate that VE-takers have different exposure to work and work-based learning prior to entering the course. VE-takers also demonstrate higher levels of career readiness at baseline according to measures of professionalism, leadership, and financial literacy. Schools should consider the tradeoffs of establishing selective processes for CTE programs. Enrolling high-performing students who can navigate more complex application processes may result in stronger engagement and improved performance in competitions, but selective processes may limit opportunities for students who could benefit from intensive work-based learning experiences.

VERSION: January 2026

Suggested citation: Berglund, Tiffany, Lindsay Daugherty, Katherine Hughes, Umut Özek, and Nazia Wolters. (2026). Running a Business in High School: Selection into the Virtual Enterprises Program. (EdWorkingPaper: 25-1329). Retrieved from Annenberg Institute at Brown University: https://doi.org/10.26300/qxaf-v470

Running a Business in High School: Selection into the Virtual Enterprises Program

Tiffany Berglund
RAND Corporation

Lindsay Daugherty
RAND Corporation

Katherine Hughes
EdWordian, LLC

Umut Özek
RAND Corporation

Nazia Wolters
RAND Corporation

This version: September 3, 2025

Running a Business in High School: Selection into Virtual Enterprises

Abstract: To better prepare high school students for the workforce, many schools and districts are building career and technical education coursework that provides students with the opportunity to deeply engage in work-based learning. Virtual Enterprises (VE) is a program where students open school-based enterprises, hold positions in the company (e.g., Chief Executive Officer, Marketing Director), sell products on a virtual market with other participating schools, and engage in regional and national competitions. We first examine how schools enroll students in VE courses, drawing on a survey of VE teachers across the country and interviews with school staff in two districts. We find that some schools have selective processes to determine which students will participate, and VE programs in Kern High School District and New York City Public Schools are more likely to be selective than programs nationally. We leverage historical administrative data from Kern High School District and New York City Public Schools to examine the characteristics of students who participate in Virtual Enterprises. We find that VE-takers have significantly higher prior test scores, have lower prior absences and disciplinary incidents, and are significantly less likely to be identified as English learners and special education students. Prior course-taking patterns also differ for VE-takers. The differences in characteristics of VE-takers cannot be fully explained by sorting into schools or pathways. Survey data from six schools across the two districts indicate that VE-takers have different exposure to work and work-based learning prior to entering the course. VE-takers also demonstrate higher levels of career readiness at baseline according to measures of professionalism, leadership, and financial literacy. Schools should consider the tradeoffs of establishing selective processes for CTE programs. Enrolling high-performing students who can navigate more complex application processes may result in stronger engagement and improved performance in competitions, but selective processes may limit opportunities for students who could benefit from intensive work-based learning experiences.

Keywords: work-based learning; career and technical education; career readiness; entrepreneurship; financial literacy

Running a Business in High School: Selection into Virtual Enterprises

1. Introduction

Employer surveys and industry groups consistently report that employers place a high value on new workers who have employability skills such a teamwork, problem-solving, and communication, but have difficulty finding them (Green et al., 2023; Jobs for the Future, 2019; Prising, 2020; Society for Human Resource Management, 2019). To support career and college readiness, high schools have made improvements to the career and technical education (CTE) opportunities offered to students. In the past, CTE programs (previously "vocational education") were often criticized for lower quality curricula and tracking of lower-income students into these programs (Hodge et al., 2020). More recently, CTE programs have become more rigorous, emphasizing the acquisition of technical, employability *and* academic skills, and recognizing the importance of preparing all students for some postsecondary education (Cushing et al., 2019; Kim et al., 2021). High schools are arranging CTE coursework into more intentional *career pathways,* aligning CTE pathways to industry-recognized credentials and college programs, and offering CTE coursework as dual enrollment to provide students with immediate college credit (Glennie et al., 2019; Edmunds et al., 2024; Velasco et al., 2024).

High schools across the country have also prioritized efforts to embed work-based learning (WBL) opportunities into CTE programs. WBL refers to a continuum of student experiences that begins with career awareness activities and progresses to more immersive experiences in workplace settings such as internships (ACTE 2022; Shields et al., 2024). WBL allows students to apply their skills through practical experiences in real or simulated workplaces and hence can be beneficial to student career preparation and their broader personal development (Bailey et al., 2004). WBL is highlighted as an important element of CTE programs by the

Association for Career and Technical Education (Imperatore & Hyslop, 2018) and the National Governors Association (2020).

Growing evidence demonstrates positive impacts of CTE and intensive WBL experiences on student outcomes (e.g., Butrica et al., 2023; Lindsey et al., 2024). In addition, some studies indicate that the benefits of high-quality CTE experiences are larger for historically underserved populations such as low-income students and students of color (e.g., Dougherty, 2018; Lee et al., 2016; Mihaly, 2025). High-quality CTE experiences can potentially offer a tool to addressing disparities in employment and postsecondary education, so it is important to understand which students are participating in these opportunities and whether there are barriers to accessing CTE opportunities for the students who might benefit most.

In this paper we examine which students enroll, and how they come to enroll, in the Virtual Enterprises (VE) program, a WBL experience adopted by more than 500 high schools across the country. Students in the VE course create a school-based enterprise, take on roles running the business (e.g., Chief Executive Officer, Marketing Director), sell goods or services in a marketplace with other VE schools, and participate in regional and national competitions. Schools pay a licensing fee to Virtual Enterprises International and receive access to training and support for teachers, curriculum materials, and the online marketplace where school businesses exchange goods and competitions.

Most of our analyses focus on the two largest school districts in the United States offering VE, Kern High School District (KHSD) in central California, and New York City Public Schools (NYCPS). We rely on four different data sources: (1) a survey of all VE teachers across the country; (2) interview and focus group data from staff and students at five schools; (3) student-level administrative school records in two districts; (4) responses to student surveys

administered to high school seniors in six schools. We leverage the survey of VE teachers and qualitative data to describe how teachers and school administrators are placing students into VE courses. We then use student-level administrative data and student survey data to describe the characteristics of those taking VE and differences from students not taking VE.

We find that more than 60 percent of the VE teachers responding to our survey report that their schools consider participation in particular CTE programs or prior courses in determining whether a student can enter VE. This aligns with national efforts to build more intentional career pathways, and VEI recommends multi-course sequences and embedding of VE into business pathways. More than half of VE teachers reported that teacher recommendations and preferences were incorporated into the final VE placement decision through application and interview processes that students often had to complete to enroll in the program. In contrast, VE teachers were less likely to report that their schools considered grade point average (GPA). Teachers from our study districts KHSD and NYCPS were more likely to report using GPA and teacher recommendations and selection as part of the enrollment process than teachers in other responding schools, suggesting that these schools might use more selective processes.

We found differences across a broad range of baseline characteristics of high school seniors taking VE courses versus other seniors in KHSD and NYCPS administrative data. In both districts, VE-takers have significantly higher prior test scores, are more likely to be White and Asian, and are less likely to be English learners or special education students. We also show that these differences are not driven by which schools choose to offer VE; VE-takers were different from other students within their schools. We found that prior coursetaking and selection into business CTE pathways accounted for some of the differences in demographics and test

score differences for VE-takers, but we continued to find different characteristics for VE-takers even when accounting for course-taking and selection of students into business pathways.

We leveraged our survey data to examine baseline differences for VE-takers across a broader set of baseline characteristics, including prior work outside of school, work-based learning activities, participation in college preparation activities, future plans, and measures of college and career readiness. We find that VE-takers were more likely to have worked outside of school, have participated in some work-based learning experiences, and have engaged in college preparation activities. VE-takers also had higher baseline levels of career readiness on measures of professionalism, leadership, and financial literacy. These baseline differences were more pronounced in KHSD than NYCPS. When we accounted for characteristics from administrative school records (e.g., demographics, English learner and special education status, prior test scores, absences, and disciplinary incidents, and prior courses taken), we found that baseline differences on some of our survey measures (e.g., exposure to work and work-based learning) remained.

Our findings on the VE program raise the issue of tradeoffs that districts and schools face as they consider enrollment processes and criteria for CTE programs and immersive WBL opportunities. More selective criteria and processes may help to ensure students are ready for and willing to engage in these courses, but also limit access for students who could potentially benefit most from these opportunities. Our findings also have implications for researchers studying CTE programs. We highlight the value of complementing administrative school records with survey data in CTE research to better account for differences in baseline attributes of CTE participants, particularly for selective CTE programs.

2. Background

The Evolution of Career and Technical Education and Work-Based Learning

More than 11 million high school students were enrolled in CTE in 2022-23 (Advance CTE, n.d.), and the average CTE student takes more than one CTE course in a subject area (National Center for Education Statistics, 2021). CTE participation spans fields like health and business and engineering, and schools have increasingly offered pathways in emerging industries such as robotics and biotechnology (Velasco et al., 2024; Malkus, 2019). Federal funds have long supported states and districts in establishing and offering CTE programs, and federal policy has, in recent years, promoted and provided grant funding for "career-connected learning" in high schools. High schools must align federally funded CTE programs with high-skill, high-wage, in-demand occupations (Advance CTE, 2020).

There are at least three major trends that have shifted the high school CTE landscape and led to improvements in the quality of CTE over recent decades (Klein et al., 2023). First, many districts and high schools have organized CTE courses into coherent *career pathways* and encourage students to pursue multi-course sequences (e.g., Cotner et al, 2021; Haviland & Robinson, 2021; Warner et al., 2016). Second, high schools have increasingly *aligned CTE coursework with credentials of value*—either industry credentials or college credentials—by ensuring that coursework leads to certification or licensing standards, and by offering dual enrollment courses with local community colleges (e.g., Edmunds et al., 2024; Glennie et al., 2019; Velasco et al., 2024). Third, high schools have *expanded opportunities for WBL* in CTE programs (Klein et al., 2023; Ross et al., 2020).

WBL opportunities vary widely, from short-term, one-time experiences (e.g., career fairs, employer tours) to more immersive experiences that engage students in a longer period of applied learning (e.g., internships, school-based enterprises). WBL allows students to apply their

skills through practical experiences in real or simulated workplaces and can be beneficial to student career preparation and their broader personal development (Bailey et al., 2004; Ross et al., 2020). However, WBL experiences can require substantial investments from schools and employers to develop and maintain relationships and meaningful learning opportunities (Guy et al., 2009; Ross et al., 2020).

School-based enterprises are WBL opportunities where students operate a real or simulated business from within the school (Alfeld et al., 2013). To run these programs, schools must develop a curriculum related to running the business, train teachers to administer the program, and secure the additional resources needed to support business activities (Stern et al., 1994). The greater autonomy schools have with WBL under school-based enterprises may help align work experiences with curricula, improve opportunities to monitor student progress and provide feedback, and increase school control over the size of the program (Ross et al., 2020; Harder+Company, 2015). School-based enterprises also remove the need for transportation to a workplace, which can be a barrier to participation for some students (Darche et al., 2009). By pulling together a group of students in a simulated workplace, school-based enterprises may enhance opportunities for peer learning and teamwork skill development (Alfeld et al., 2013; Stern et al., 1998). The lesser need to engage employers could be a benefit in terms of time savings for school staff and program alignment, but networking and relationship-building with employers can be valuable (Ross et al., 2020). School-based enterprises such as West Virginia Simulated Workplaces bring in industry mentors to incorporate these industry connections and expertise into their program (West Virginia Department of Education, 2018).

The Virtual Enterprises Program

The VE program was first launched in 1996 in NYCPS. The program allows students to run a school-based enterprise through a global business simulation where products mostly do not exist. Each class produces a simulated product or service in an industry of their choice (e.g., technology, advertising, insurance, fashion). Classes can engage in virtual commerce with 7,500 student-run businesses in 45 countries, electronically transferring funds through a web-based banking system that links all U.S. firms with other simulated businesses worldwide. As the program expanded, Virtual Enterprises International (VEI) was established as a non-profit organization to oversee its functioning (Hughes & Golann, 2007; Harder+Company, 2015), provide curriculum, training, online platforms, and general support. VEI works with industry representatives to review the program and curriculum on an ongoing basis. VEI also has relationships with many postsecondary institutions to expand the opportunities for students to receive college credit for VE participation.

The curriculum revolves primarily around project-based learning, with very limited lecture-based instruction. Students are responsible for working together to strategically plan for and operate their business. They track revenue and pay expenses using digital currency through VE's proprietary online banking system. Students interview for and hold distinct positions within the different departments of the business (e.g., marketing, sales, human resources, accounting, information technology, design) while also managing personal finance responsibilities. As "employees" of the business, students receive direct deposit (virtual) salaries and use their income to purchase products and/or services from other VE student-run businesses. They learn about personal finance by budgeting for and paying rent and other expenses, selecting insurance and retirement plans, and filing tax returns. In addition, students attend local, national, and global trade shows and competitions, in-person and online, during which they interact with real-world

industry professionals and other simulated companies. Students do not pay for the program; schools and districts cover fees for technology access and teacher training, costs for business materials and furniture, and competition travel costs through federal, state and local funding sources.

As some high schools and districts have moved to more cohesive career pathways, the yearlong VE course has sometimes been integrated as a capstone to a business pathway. At other schools the VE course can be taken as a capstone course in other CTE clusters, through which students may incorporate additional technical, engineering, or computer science skills and coursework to develop prototypes or apps, for example. Some schools offer VE as an elective and/or alternative for filling the economics course requirement, opening it up to a broader set of students outside of particular CTE pathways.

Evidence on CTE Outcomes and Selection into CTE Programs

A growing body of research examines student outcomes for students in CTE programs, but much of the research has been descriptive or correlational, and somewhat fewer studies leverage causal methods to examine the impacts of CTE.[1] A recent meta-analysis of 28 rigorous studies of secondary-level CTE found evidence that CTE programs can lead to positive impacts on several student outcomes such as high school academic achievement and completion, college readiness, enrollment in community or technical colleges, and likelihood of employment after high school (Lindsay et al., 2024).

[1] Causal studies of CTE and WBL models require random selection of individuals into a program, or systematic assignment of students to a program according to cutoff in criteria (e.g., exam scores, GPA). It can be challenging to establish these rigorous study designs when CTE courses that are built into pathways and use school-established applications and eligibility criteria.

Studies also examine the effectiveness of intensive WBL experiences such as internships, apprenticeships, and school-based enterprises. Reviews of the research on registered apprenticeships find evidence of positive benefits on individual earnings, employer retention, and society (Butrica et al., 2023; Ross et al., 2020). Experimental studies of high school and youth internship programs have not found any evidence of positive impacts (Cummings, Farrell, and Skimmer, 2018; Theodos et al., 2023). Neumark and Rothstein (2006) demonstrated that participation in school-based enterprises was associated with a greater propensity to attend college. The authors of this report are currently carrying out a study of the impact of the VE program.

Studies of CTE also show some evidence of variation in impacts across key subgroups. Several studies have shown that students with disabilities can benefit from CTE programs (Dougherty et al., 2018; Lee et al., 2016; Wagner et al., 2016). Studies of CTE programs in Nevada, North Carolina have shown larger impacts for low-income students (Ecton & Dougherty, 2023; Edmunds et al., 2024; Mihaly, 2025), and at least one study showed larger benefits for students of color (Ecton & Dougherty, 2023). Most studies find larger CTE impacts for male participants, which has drawn attention since they lag females on secondary and postsecondary attainment indicators (Brunner et al., 2023; Rosen et al., 2023). However, a recent study demonstrated larger benefits for female CTE participants in Nevada (Mihaly et al., 2025). Given evidence that CTE can help to support success for historically underserved populations, it is important to ensure that these students can access high quality CTE opportunities.

Studies that examine the characteristics of students participating in high-quality CTE opportunities tend to find that students are not representative of the overall population and fall into groups that have historically had access to other high-quality high school opportunities. For

example, research found that career academies in North Carolina enroll higher academically achieving students (Hemelt et al. 2017). Students who enrolled in CTE high schools of choice in Massachusetts were less likely to be Black and Asian, had higher test scores, and had higher attendance rates (Ansel et al., 2022). On the other hand, low-income students and students with disabilities were more likely to participate in these CTE high schools of choice (Ansel et al., 2022). Students who participated in dual enrollment CTE courses were more likely to be white and less likely to be low-income (Fink & Jenkins, 2023; Velasco et al., 2024). The distribution of students across different fields of study within CTE also indicates considerable differences by race, gender, and class (Arbeit, Leu, & Dalton, 2017; Klein et al., 2023). These findings raise concerns about equity, and there are calls for districts and schools to do more to ensure that all students can access high-quality CTE programs (Fletcher, 2022; Kim et al, 2021).

Sorting of students across CTE programs is described by Haviland and Robbins (2021) as a two-way process, with (1) individuals choosing programs based on varying information, abilities, and preferences, and (2) schools and districts determining program offerings and determining marketing and selection processes. When districts and schools allow students to choose programs, individual abilities and preferences may influence the decisions of students to participate in these programs (Haviland & Robbins, 2021). But information is also critical; and evidence suggests that students may face informational barriers that prevent them from fully taking advantage of CTE opportunities (Ansel et al., 2022; Haviland & Robbins, 2021).

School and district factors may also contribute to which students participate in CTE programs. Some evidence suggests that higher-status and more desirable CTE programs are offered in wealthier schools, and the lower-status and more traditional trades programs are offered in less wealthy schools (Hodge et al., 2020). Application processes and enrollment

criteria are commonly used for CTE programs with excess demand. For example, early college high school models may require families to complete applications and then use lottery processes to determine which students will fill limited slots within programs (Edmunds et al., 2024; Rosen et al., 2023). Most states offering dual enrollment courses set requirements that students meet "college readiness" indicators, which are often determined according to standardized assessments or GPAs (Education Commission of the States, 2022). On the other hand, the California Partnership Academies, a widespread state-funded CTE model, chooses participants based on indicators that are predictive of dropping out of high school (California Department of Education, n.d.).

Research on sectoral training programs for adult learners recommends pre-screening as a promising feature of workforce training programs for adult learners (Katz et al., 2022). Eligibility and pre-screening efforts may be valuable in helping schools and districts to ensure that the students have the necessary interest and will be willing to fully engage in immersive WBL opportunities. Some schools and districts may embed immersive WBL opportunities as capstone experiences after a series of prerequisite courses to ensure students have the basic knowledge to support success. But eligibility criteria and application processes may limit access to high-quality CTE opportunities for students who face time and information constraints, and this limited access may contribute to reinforcing existing career and college readiness inequities (Ansel et al., 2022; Fink & Jenkins, 2023; Kim et al., 2022). This paper builds on the existing literature around CTE program selection and enrollment to describe the students participating in a popular WBL program and the processes schools use to enroll students in the program.

3. Data and Methods

Currently there are VE programs in more than 500 schools across 14 states. Our analysis of VE participation primarily focuses on two districts, and these two districts were VE's earliest and strongest adopters. NYCPS is where VE was developed, and as of 2024-25 more than 30 schools in NYCPS offered VE, making it the district with the largest number of schools participating in the program. KHSD began offering VE in 2011 and is the second largest VE-offering district with 10 participating schools in 2024-25. NYCPS hosts the national competition each year, and schools from these two districts won most of the top awards at the 2024-2025 national competition.

We rely on four different data sources to examine the sorting of students into the VE program: (1) a survey of VE teachers in all VE-offering schools; (2) staff interview and student focus group data from five schools; (3) student-level administrative school records; and (4) responses to student surveys administered to high school seniors in six schools. Outside of the national survey of VE teachers, our analysis focuses on two districts that offer the most VE programs, KHSD and NYCPS. As the largest and earliest adopters of VE, these districts may not be representative of all VE-offering schools.

We draw on the survey of VE teachers and qualitative data to describe how teachers and school administrators are placing students into VE courses. The online survey link was distributed to 461 VE teachers in schools across 14 states through emails from regional VE coordinators. The survey opened in March 2022 and closed in May 2023. We received a total of 204 complete responses representing VE teachers across 14 states, for a response rate of 44 percent. We received responses from five teachers in KHSD schools and 16 teachers in NYCPS schools. While respondents may not be representative of all VE teachers, they provide a source of evidence on the range of enrollment approaches schools are taking to enrolling students in VE

programs, and we can examine how our two primary districts differ from the broader set of schools offering VE.

We invited teachers across all VE-offering schools in KHSD and NYCPS to participate in student surveys and site visits (10 in KHSD and 35 in NYCPS). Ultimately 4 KHSD and 2 NYCPS schools agreed to engage in these research activities. One school offered three courses of VE and had two VE teachers, while the other five schools each offered one VE course and had a single teacher. We conducted site visits to five of these six schools. KHSD site visits took place in spring 2024 (two schools) and spring 2025 (one school), and NYCPS site visits took place in spring 2025 (two schools). Site visits consisted of a classroom observation, focus groups with students, and interviews with the VE teacher, an administrator, and a school counselor. We drew on the 6 student focus groups and 10 staff interviews to provide a more in-depth description of enrollment processes for VE courses in five schools.

We then used student-level administrative data and student survey data to describe the characteristics of those taking VE, and how they differ from students not taking VE. To examine the extent to which the differences between VE-takers and other seniors are driven by schools attended or difference in high school pathways, we control for school fixed effects and course history in some specifications. We examine student-level administrative data for all 12^{th} grade students between 2013-14 school year and 2024-25 in KHSD (2023-24 for NYCPS). The high school records included test scores (11^{th} grade test scores on Smarter Balanced Summative Assessments and California Alternate Assessments in KHSD and Regents scores in NYCPS), demographic information on students, such as race, gender, English learner status, exceptional/special education status, and schools attended. We also observe detailed course enrollment records (including unique course identifiers and name, which we use to identify

course types), and information about student disciplinary problems and attendance. Finally, these K–12 records are linked to National Student Clearinghouse records for both districts for students who graduated from high school between 2017 and 2024 in KHSD and between 2014 and 2022 in NYCPS.

To capture baseline participant characteristics on work, work-based learning, career readiness, and business exposure, we conducted online surveys of high school seniors at four KHSD schools in Fall 2023 and 2024 and two NYCPS schools in Fall 2024. Work-based learning and college and career readiness survey items were largely drawn from existing scales, and we partnered with a vendor to draw from their existing item pools for reliable assessment scales measuring professionalism and leadership competencies.[2] We consulted with our technical advisory group of five CTE experts to get feedback on the survey instrument. Appendix Table 1 provides the number of students surveyed by school and survey wave along with survey response rates. Overall, our baseline survey response rate in the four KHSD schools was approximately 50 percent, while the response rate for our two NYCPS schools was 38 percent.

4. Results

Do VE-Offering Schools Differ from Others?

Table 1 examines differences in the characteristics of seniors in schools that did and did not offer VE. In both districts, schools that (ever) offered VE had seniors with slightly higher 11th grade scores and have lower prior absence and disciplinary incident rates. In KHSD, high school seniors in "ever-offering" high schools were comparable to seniors in other schools

[2] NOCTI is an organization that VE has partnered with to create assessments for students participating in the program on professionalism, leadership, and other competencies. More information can be found at https://www.nocti.org/resources/credential-preparation/

demographically. In NYCPS, seniors in VE-offering schools were more likely to be Asian and less likely to be African American. NYCPS schools that offered VE also had a smaller proportion of students participating in special education. In both districts, VE-offering high schools were larger (i.e., had more seniors in a cohort).

How do Schools Place Students into VE Courses?

Districts and schools determine which students enroll in VE. The VEI program implementation guide provides counsel on a range of topics, including the qualities of an ideal VE teacher, and how a traditional classroom should be arranged to look like a place of business. The implementation guide does advise that schools implement entry-level business courses so that VE students will enter the program with a foundation of basic business concepts as well as technical skills. But the program does not require or recommend any particular processes for student application or enrollment, with the result that there is considerable variation across schools in student selection.

We surveyed all VE teachers from May 2022 to May 2023 to learn about enrollment practices. Table 2 summarizes some of the results. Of the respondents, 18.6 percent reported that there were more students interested in the course than could be accommodated (i.e., the course was oversubscribed). Of those who reported an issue of oversubscription, they estimated that approximately 18 students are interested in VE each year who do not have an opportunity to enroll. The status of oversubscription is a slightly larger problem in KHSD and NYCPS where 28.6 percent of respondents reported there were more students interested in the course than could be accommodated, and approximately 25 students are interested in VE each year who do not have an opportunity to enroll.

To identify students for the limited number of course slots, 85.3 percent of respondents reported considering factors such as student performance, prior course taking, and teacher or advisor recommendation. As shown in Table 2, 55.9 percent reported participation in a CTE program, 51.0 percent reported completion of prerequisite courses, 45.6 percent reported teacher or advisor judgement was used to determine which students enroll in VE, and 13.2 percent reported student GPA or academic performance.[3] Some of these practices are recommended by VEI and are promising CTE approaches, including ensuring that VE-takers are participating in a relevant CTE pathway and requiring related coursework. But the use of GPA and academic performance and teacher recommendations are additional selective criteria that schools independently determine. Compared to other districts, KHSD and NYCPS teachers were more likely to report that their school considers student GPA or academic performance and teacher or advisor judgement to determine VE enrollment (71.4 percent of KHSD and NYCPS survey respondents versus 44.8 percent among respondents from other schools and districts).

The qualitative data provide additional insights into student selection in the particular high schools and programs like VE. KHSD is a high school-only district with 19 comprehensive high schools. High school placement is determined by attendance boundaries (neighborhoods). Various CTE programs are offered at the high schools; ten of them offer VE. The district also has two regional occupational centers where students attend CTE programs for part of their school day. The regional occupational centers do not duplicate programs offered in the high schools so they do not offer VE. Approximately one-quarter of graduating seniors every year have completed CTE programs.

[3] Student enrollment criteria are not mutually exclusive. For example, student GPA and teacher recommendation can be used in conjunction to determine enrollment of students in VE.

According to interview data from the KHSD site visits, course selection is called "preferencing" – students list their course preferences for the following year – and guidance counselors are integral to the process. Enrollment in VE varies according to whether more students are interested than there are available seats. Where student demand is similar to the number of spots, students must still submit counselor and teacher recommendations. In schools where there is more demand than supply, students are interviewed by the VE teacher. Teachers reported focusing the marketing of the program on high-performing students (e.g., in AP courses) and students in relevant pre-requisite courses. Teachers said that the application and interview process helps them to identify students who are really invested in the activities of operating a business, and sometimes students "weed themselves out" once they learn more about the program during the interview. The program is considered challenging and teachers want to enroll students who will be deeply engaged and work to be competitive in regional and national competitions.

NYCPS has 533 public high schools. Incoming students list their choices in order on a central district application. Students are then sorted into schools based on their preferences and the school's policy and priorities. A school's priority can simply refer to geography, such as a school in the Bronx prioritizing students who live in that borough. "Zoned" schools prioritize students who live in a specified school zone (smaller than a borough); all of the students in the zone are offered a place. Many schools are categorized as "Ed Opt," a process that ensures that schools enroll students from a mix of academic levels. These schools use academic data to group students into low, middle, and high categories and distribute spaces in the school evenly among groups. NYCPS has a number of schools that require special tests or other entry criteria such as auditions, but VE is not offered in such schools.

VE is a senior capstone course in both of the NYCPS schools we visited, and both have prior course-taking requirements. In one of the schools, students must take accounting their junior year to be eligible; in the other school, VE is the third course in a business pathway that includes computer applications and entrepreneurship. Both schools have application processes that include meetings with the VE teacher and potentially other school personnel as well. One school administrator reported, "We're rather selective, very selective with those students because there's a lot of activities that take place outside of school. You got to really dedicate your time to it." In other words, the school staff saw selective application procedures as important to ensuring that students were sufficiently engaged and willing to take on the responsibilities that came with taking the VE course.

How do VE-Takers Differ from Other High School Seniors?

Student Attributes in Administrative School Records

Table 3 compares VE-takers in our two districts with all other high school seniors along prior test scores, demographics, English learner and special education status, and prior absences and disciplinary incidents. In particular, the first two columns present the means of the baseline characteristics for VE-takers and other high school seniors in the two districts; the third column presents the difference; the fourth column introduces school fixed-effects to examine the extent to which the differences are driven by differential sorting of VE-takers across school settings; and the last column accounts for courses taken in 11^{th} grade.

The first three columns of Table 3 show that VE-takers in both districts are positively selected. In particular, VE-takers have significantly higher prior test scores, have lower prior absences and disciplinary incidents, and are significantly less likely to be identified as English learners and special education students. For example, in KHSD, VE-takers had 11^{th} grade

reading and math scores that are 60 to 70 percent of a standard deviation higher compared other high school seniors. VE-takers in KHSD were also 5 percentage points less likely to be identified as an English learner and 8 percentage points less likely to be identified as a special education student in 11th grade. There were also racial and ethnic differences in participation; VE-takers in KHSD were 5 percentage points more likely to be White, 6 percentage points more likely to be Asian, and 10 percentage points less likely to be Hispanic.

Similar, yet slightly smaller differences emerge in NYCPS. VE-takers scored 20 to 30 percent of a standard deviation higher on the Regents English and Regents Algebra tests, had fewer prior year absences, were 7 percentage points less likely to be identified as an English learner, and were 7 percentage points less likely to be identified as a special education student in 11th grade. VE-takers in NYCPS were 6 percentage points more likely to be Asian and 8 percentage points less likely to be African American.

In the fourth column of Table 3, we show that only a small portion of these differences are driven by differential selection of students into VE-offering schools (or differential offering of VE across school settings). Findings suggest that the observed differences in baseline attributes between VE-takers and other high school seniors decline slightly after we introduce school fixed-effects into our model in both districts, yet significant differences still exist.

Table 4 examines the differences between VE-takers and other high school seniors in terms of their high school course-taking pathways. The results reveal significant differences especially in business CTE (in KHSD) and business and technology courses (in NYCPS) in 11th grade. In KHSD, students who were placed in VE courses were 27 percentage points more likely to have taken a CTE course in 11th grade (this difference roughly corresponds to 70 percent of the mean for other high school seniors), about 39 percentage points more likely to have taken a

business CTE course in 11th grade, and 25 percentage points (or 50 percent of the mean for other high school seniors) more likely to have taken an honors or AP course in 11th grade. The differences in advanced course-taking (i.e., honors and AP courses) can be traced back to differences in 9th and 10th grades, but the pathways for VE-takers and other seniors in terms of CTE (and business CTE) course-taking in KHSD diverge most in 11th grade.

The bottom panel of Table 4 examines NYCPS data and compares the credits earned in grades 9 through 11 broken down by course type/subject for the VE-takers in our sample and other high school seniors. The findings mirror those in KHSD and indicate that VE-takers earn significantly more credits in business and technology courses in grades leading to their senior year, and that these courses primarily crowd out foreign language and arts courses. The course-taking pathways of VE-takers and other seniors in NYCPS seem to diverge in 10th grade rather than 11th grade.

The last column of Table 3 examines how CTE participation and course history might be driving some of the estimated differences in baseline characteristics for VE-takers. When we control for course history in grades 9 through 11 (along with school fixed-effects), we find that course history explains a sizable portion of the prior achievement differences between VE-takers and other high school seniors. Differences in course history explains about a third of the 11th grade test score differences in KHSD and about two-thirds of Regents score differences between VE-takers and other high school seniors in NYCPSPS. That said, sizable differences in baseline student outcomes and characteristics remain even after controlling for course history in both districts.

Student Attributes in Survey Data

We supplement our administrative data analysis with high school senior surveys we conducted in a smaller subset of four high schools in KHSD and two high schools in NYCPS. Our baseline surveys allow us to capture data on unobservable differences between VE-takers and other students that might not be captured in the administrative data, such as prior experiences with work and work-based learning and baseline career readiness.

Table 5 compares experiences working outside of schools for VE-takers to other seniors. The findings suggest that VE-takers in KHSD were more likely to have worked for pay since 9th grade and were more likely to report currently working for pay compared to other high school seniors. In NYCPS, we do not find any statistically significant differences.

Table 6 repeats the same analysis using measures of prior WBL experiences, revealing significant differences in both districts. Compared to other seniors in KHSD, VE-takers were more likely to have attended a career day or job fair, more likely to have taken a tour of a workplace, more likely to have shadowed someone on the job, more likely to have previously run a school business, more likely to have participated in a career and technical student organization (CTSO), and more likely to have participated in an internship or co-op. VE-takers in NYCPS were more likely to have taken a tour of a workplace, more likely to have completed a project for a client, more likely to have previously run a school business, and more likely to have participated in a CTSO.

When we examine differences along college preparation activities and future plans, we find differences between VE-takers and other high school seniors in KHSD but not NYCPS (Table 7). VE-takers in KHSD were more likely to have taken a tour or attended an orientation program, more likely to have searched the internet or read materials on colleges, more likely to

have taken a college admission exam, and more likely to have taken a college credit-bearing course in high school.

Table 8 compares VE-takers in the two districts with other high school seniors along baseline measures of academic motivation, entrepreneurial self-efficacy, college and career readiness, financial literacy, leadership, and professionalism. In KHSD, VE-takers score significantly higher on all these measures compared to other high school seniors, with differences ranging from 30 percent of a standard deviation on baseline academic motivation to 60 percent of a standard deviation higher on a leadership measure. In NYCPS we did not find differences across most of these measures. The only difference that was for financial literacy: VE-takers in NYCPS scored roughly 30 percent of a standard deviation higher on this measure compared to other high school seniors.

Finally, in Table 9, we examine the extent to which the differences in baseline survey responses between VE-takers and other high school seniors in KHSD are explained by differences along the baseline attributes observed in administrative school records such as student demographics, English learner and special education status, prior test scores, absences, and suspensions, and course history.[4] This is an important exercise that could shed light on the extent to which survey data add value in capturing unobserved baseline differences between VE-takers and other high school seniors in administrative data.

The findings in Table 9 show that in KHSD the observable characteristics captured in administrative school records (e.g., prior coursetaking, test scores, demographics) explain a sizable portion of the differences in measures related to college readiness, financial literacy, leadership, and professionalism. For example, accounting for student characteristics from

[4] We are unable to conduct a similar exercise in NYC as the baseline survey was administered in Fall 2024 and the last year of the administrative school records (as of this writing) was 2022-23 school year.

administrative data explains 73 percent of the difference between VE-takers and other high school seniors in financial literacy and 83 percent of the difference in professionalism. On the other hand, accounting for characteristics in administrative data in KHSD does very little to reduce the differences in measures of prior work experience or WBL experience between VE-takers and other students. For example, these baseline attributes explain less than 10 percent of the difference in the likelihood that the student is currently working for pay, the likelihood that the student took a tour of a workplace or participated in an internship or a co-op. Other unobserved factors such as student preferences for WBL and career plans may be factoring into student decisions to participate in VE and other types of work and WBL. These findings suggest that administrative data may be able to account for baseline differences in career and college readiness competency measures, but it may be important to leverage other data sources that can account for baseline work and WBL learning experiences when assessing the efficacy of WBL programs such as VE.

6. Discussion

Many high schools and school districts across the U.S. are focused on offering high-quality CTE coursework and expanding opportunities for WBL, and growing evidence of the efficacy of these programs suggests that they can improve high school graduation, college, and career outcomes (Lindsay et al., 2024). Our research shows promising early impacts on career readiness for the VE program (Berglund et al., 2025). In addition, our research and other research on high-quality CTE opportunities suggest that low-income students and other historically underserved communities may benefit most from these opportunities (e.g., Berglund et al., 2025; Ecton and Dougherty, 2022; Mihaly et al., 2025).

Our administrative and survey data indicate that the VE programs in these two districts served students who were different from other students across almost every measure we examined. VE-takers had higher test scores, were less likely to be participating in English Learner and special education programs, and were more likely to be White or Asian. VE-takers also had more work experience outside of school, more WBL experiences, and had higher baseline levels of career readiness. These findings align with other studies that show that participants in CTE programs with application and entry requirements tend to be positively selected relative to the overall student population (e.g., Ansel et al., 2022; Edmunds et al., 2024; Velasco et al., 2024).

One factor contributing to the sorting of students into VE has been the efforts of schools to incorporate CTE courses into intentional pathways rather than offering the courses as ad hoc elective opportunities. VE is a business-focused course, and the integration of VE as a capstone course in business pathways and requiring prior business coursework are practices that the national VE office and other CTE organizations recommend as a promising practice. Different types of students choose business pathways and begin to take courses in KHSD and NYCPS as early as 10^{th} or 11^{th} grade. This suggests that efforts to address access to VE might require broader and earlier interventions to promote business pathways to student groups that participate less frequently. Some studies recommend the importance of reaching students as early as middle school to ensure students have not already narrowed their interests, and to build awareness of and preparation for high-quality CTE pathways and immersive WBL experiences (e.g., Ansel et al., 2022; Callahan et al., 2019). The broader evidence on selection into business CTE pathways is limited and mixed. National survey data showed that business participants were similar to the overall population in terms of race and ethnicity (Arbeit, Leu & Dalton, 2017), while other

studies found that White CTE participants disproportionately end up in business occupations (Fletcher, 2022).

Even when accounting for which schools offered VE and for prior coursetaking and CTE pathway experiences in KHSD, we continued to find differences in the characteristics and baseline work and WBL experiences of VE-takers relative to other students. These differences in prior exposure to WBL may be driven by other factors such as student preferences and selective enrollment processes may be attracting students with a history of prior work and WBL.

This evidence aligns with broad concerns in the CTE literature about access to high quality CTE opportunities (e.g., Fletcher, 2022; Fink & Jenkins, 2023; Kim et al., 2021). The decisions that high schools and districts make about how to implement CTE and WBL programs shape which students have access to these opportunities. Schools offering VE in KHSD and NYCPS were frequently oversubscribed and used application processes and set participation requirements (e.g., prior course-taking, GPA). Application processes and entry criteria are common to other popular and intensive forms of CTE such as dual enrollment and career academies (e.g. Ansel et al., 2022; California Department of Education, n.d., Edmunds et al., 2024; Rosen et al., 2023).

Districts and schools should be cautious about establishing additional criteria (e.g., GPA requirements, multi-stage application requirements) for enrollment in VE and in other promising CTE and WBL programs. These screening processes may ensure that the most engaged, competitive, and career-oriented set of students participate in the program, but these students may not be the ones who might benefit most from the VE program. Schools should consider the tradeoffs between competitiveness, engagement, and access when establishing application and enrollment criteria.

The tradeoffs between selective and non-selective enrollment processes can be particularly tough to navigate for the VE program due to the emphasis on competitions as a central component of a program. School staff and students in five KHSD and NYCPS schools reported the competitive nature of the VE program as being important to driving student engagement. Ensuring competitiveness in regional and national competitions was a motivator for students and staff at these schools. Compared to VE programs in other districts, our national survey data suggest that VE programs in these two districts are more likely to be oversubscribed and more likely to use selective enrollment than other VE schools across the county.

One way that some schools have ensured that VE can be offered to all interested students is to expand sections of the course. But given the teacher time and costs associated with implementing the program, some schools may not have sufficient teacher capacity and funding to offer multiple sections. In addition, schools may want to be cautious about sorting students across sections in an intentional way (e.g., "competitive" and "stretch" sections), as these practices could alter student perceptions and engagement in the "less desirable" course and limit the opportunities for peer learning.

The findings also offer evidence for researchers to consider in assessing CTE programs. Matching on administrative data alone may be insufficient if there are likely to be many other unobserved factors that determine whether a student participates in a program. This may be particularly true when schools have selective entry procedures that are determined at the local level and not fully observed in administrative data (e.g., teacher preference, targeted marketing of the program). We demonstrated that accounting for administrative data differences did account for a large portion of baseline differences in career readiness measures for VE-takers but did not eliminate the differences in prior exposure to work and WBL. Future research will

incorporate survey and administrative data to create better matches for VE-takers and allow us to better estimate the impacts of the program. Ideally studies of CTE program impacts would leverage experimental designs to account for unobservable differences between VE-takers and other students, but randomization was not feasible for VE because schools did not face sufficient oversubscription and were not willing to give up local control of student selection processes.

Our study was limited in that we drew on a relatively small sample of just six schools for our survey and site visit data. Schools that volunteer for a study and students who respond to surveys are unlikely to be representative of schools and students overall in our two districts; we show that this is true for our sample in a related paper (Berglund et al., 2025). Our sample came from two districts that have been the longest adopters and have the most participating VE schools. Our national survey indicates that teachers in these districts report more oversubscribed programs and a greater likelihood of relying on selective factors to choose participants. Thus, we cannot generalize our findings to all VE schools in these two districts or across the country. In addition, we focus on a single CTE program offering. Our findings align with the broader CTE literature in suggesting that historically underserved populations are less likely to access a high-quality CTE opportunity, but are only applicable to the VE program.

Acknowledgements

This research was supported by the Institute of Education Sciences (U.S. Department of Education) through grant R305A210198 to the RAND Corporation. The opinions expressed are those of the authors and do not represent the views of the Institute of Education Sciences or the U.S. Department of Education. We appreciate the support from our partners at KHSD and NYCPS with data preparation and transfer, and we are grateful to the VE teachers at our six participating high schools who supported distribution of student surveys and participated in implementation data collection. We had several other team members who contributed to the project, including Fatih Unlu, Helen Muhisani, Mariesa Hawkins, Kelly Reese and Cyril Cherian. We thank our advisory group members Svetlana Darche, Edward Fletcher Catherine Imperatore, Jim Kemple, and Trey Miller for their input throughout the project, and Catherine. We appreciate the reviews of the content by Catherine Imperatore and Jill Cannon, and we thank Leslie Canterbury for editing support. We received feedback and support from Virtual Enterprises International throughout the project and are grateful to Iris Blanc, Tom Smith, Michael Brownstein.

References

Advance CTE. (n.d.). CTE in your state. https://careertech.org/our-vision/cte-in-your-state/

Advance CTE. (2020). *Aligning to opportunity: State approaches to setting high skill, high Wage and in demand*. https://careertech.org/wp-content/uploads/sites/default/files/files/resources/Aligning_Opportunity_HighSkill_HighWage_InDemand.pdf

Alfeld, C., Charner, I., Johnson, L., & Watts, E. (2013). Work-based learning opportunities for high school students. *National Research Center for Career and Technical Education*. https://www.nrccte.org

American College Testing Association. (2018). *The condition of college and career readiness*. https://www.act.org/research-policy/college-career-readiness-report-2018/

Ansel, D., Dougherty, S., Ecton, W., Holden, K., & Theobald, R. (2022). Student interest and equitable access to career and technical education high schools of choice. *Journal of School Choice*, *16*(4), 588-622.

Arbeit, C. A., Leu, K., & Dalton, B. (2017). *Secondary Career and Technical Education: Differences in Access, Participation, and Outcomes in Two National Studies.* Office of Career, Technical, and Adult Education, US Department of Education.

Association for Career and Technical Education (ACTE). (2022). *What is Work-Based Learning? (Fact Sheet)*. https://www.acteonline.org/wp-content/uploads/2024/06/WBL_Fact-Sheet_Final.pdf

Bailey, T. R., Hughes, K. L., & Moore, D. T. (2004). *Working Knowledge: WorkBased Learning and Education Reform*. Routledge. https://www.routledge.com/Working-Knowledge-Work-Based-Learning-and-Education-Reform/Bailey-Hughes-Moore/p/book/9780415945660

Brunner, E. J., Dougherty, S. M., & Ross, S. L. (2023). The effects of career and technical education: Evidence from the Connecticut Technical High School System. Review of Economics and Statistics, 105(4), 867–882.

Butrica, B. A., Jones, E., Rosenberg, L., Sattar, S., & Sotelo, V. (2023). *A review of the literature on registered apprenticeships*. Urban Institute.

California Department of Education (n.d.). *Program Overview: California Partnership Academies*. https://www.cde.ca.gov/ci/gs/hs/cpaoverview.asp

Callahan, J., Ito, M., Campbell Rea, S. and Wortman, A. (2019). *Influences on occupational identity in adolescence: A review of research and programs.* Irvine, CA: Connected Learning Alliance.

Cotner, H., Bragg, D., Cheng, I., Costelloe, S., Freeman, B., Goold, G., Heiser, E., Lemire, S., Miller, D. G., Porowski, A., Van Noy, M., & Yadav, E. (2021). *Designing and delivering career pathways at community colleges: A practice guide for educators (WWC 2021007).* U.S. Department of Education, Institute of Education Sciences, National Center for Education Evaluation and Regional Assistance.

Cushing, E., English, D., Therriault, S. & Lavinson, R. (2019). *Developing a college- and career-ready workforce: An analysis of ESSA, Perkins V, IDEA, and WIOA*. American Institutes for Research. https://www.air.org/sites/default/files/Developing-a-Career-Ready-Workforce-Brief-March-2019.pdf

Darche, S., Nayar, N., & Bracco, K. (2009). *Work-based learning in California: Opportunities and models for expansion*. The James Irvine Foundation. https://www2.wested.org/www-static/online_pubs/workbasedlearning.pdf

Dougherty, S. M. (2018). The effect of career and technical education on human capital accumulation: Causal evidence from Massachusetts. *Education Finance and Policy, 13*(2), 119–148.

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.

Edmunds, J.A., Unlu, F., Phillips, B., Mulhern, & C., Hutchins, B.C. (2024). CTE-focused dual enrollment: Participation and outcomes. *Education Finance and Policy, 19*(4): 612–633. https://doi.org/10.1162/edfp_a_00414

Education Commission of the States. (2022). *50 state comparison: Dual/concurrent enrollment.* https://reports.ecs.org/comparisons/dual-concurrent-enrollment-2022-09b

Fink, J. and Jenkins, D. (2023). *Rethinking dual enrollment as an equitable on-ramp to a career-path college degree program after high school.* Community College Research Center. https://ccrc.tc.columbia.edu/publications/revamping-dual-enrollment-equitable-college-degree-paths.html

Fletcher, E. C. (2022). Access to and equity in rigorous career and technical education programs: Trends, issues, and future directions in the field. *Career and Technical Education Research*, *47*(3), 17-27.

Glennie, Ed., Lauff, E., & Ottem, R. (2019). *Rollout of the Career and Professional Education (CAPE) Act.* RTI International.

https://static1.squarespace.com/static/5c6398467a1fbd31149c1ce7/t/5dd47796f0a28a2d3ba80edd/1574205340410/Issue_Brief_Rollout_of_the_CAPE_Act.pdf

Green, S., Sanczyk, A., Chambers, C., Mraz, M., & Polly, D. (2023). College and career readiness: A literature synthesis. *Journal of Education*, *203*(1), 222-229.

Guy, B., Sitlington, P. L., Larsen, M., & Frank, A. (2009). Work-based learning and school-to-work transition planning for students with disabilities. *Teaching Exceptional Children, 41*(6), 12–19. https://doi.org/10.1177/004005990904100602

Harder+Company Community Research. (2015). *Virtual Enterprises International: 2015–16 annual report*. https://veinternational.org/annual-reports/

Haviland, S. J., & Robbins, S. B. (2021). *Career and technical education as a conduit for skilled technical careers: A targeted research review and framework for future research* (ETS Research Report No. RR2107). Educational Testing Service. https://doi.org/10.1002/ets2.12318

Hemelt, S. W., Lenard, M. A., & Paeplow, C. G. (2017). *Building better bridges to life after high school: Experimental evidence on contemporary career academies* (Working Paper 176). American Institutes for Research, CALDER. https://eric.ed.gov/?id=ED572934

Hodge, E., Dougherty, S., & Burris, C. (2020). *Tracking and the future of career and technical education: How efforts to connect school and work can avoid the past mistakes of vocational education*. National Education Policy Center. https://nepc.colorado.edu/publication/cte

Hughes, K. L., & Golann, J. W. (2007, September). *When the virtual becomes real: Student learning in the Virtual Enterprises program* (Institute on Education and the Economy, CCRC Report). Teachers College, Columbia University. https://ccrc.tc.columbia.edu/interactive-reports/virtual-enterprises-student-learning.html

Imperatore, C., & Hyslop, A. (2018). *2018 ACTE Quality CTE Program of Study Framework*. Association for Career & Technical Education. https://www.acteonline.org/wp-content/uploads/2024/09/HighQualityCTEFramework2018-Aug2024.pdf

Jobs for the Future. (2019). *The future of work: Preparing students for success in the 21st century*. https://www.jff.org/resources/future-work-preparing-students-success-21st-century/

Katz, L. F., Roth, J., Hendra, R., & Schaberg, K. (2022). Why do sectoral employment programs work? Lessons from WorkAdvance. *Journal of Labor Economics*, *40*(S1), S249-S291.

Kemple, J.J., Unterman, R., & Dougherty, S. (2024). *Career and technical education in comprehensive high schools: Lessons from New York City*. The Research Alliance for New York City Schools. https://steinhardt.nyu.edu/sites/default/files/2024-

03/CTE%20in%20Comprehensive%20High%20Schools%20Full%20Report-remediated%203.14%20update.pdf

Kim, E.H., Flack, C.B., Parham, K., & Wohlstetter, P. (2021). Equity in secondary Career and Technical Education in the United States: A theoretical framework and systematic literature review. *Review of Educational Research, 91*(3): 356–396.

Klein, S., Rosen, R., Beal, K., & Salimi, S. (2023). *Career and Technical Education: Current policy, prominent programs, and evidence*. MDRC. https://www.mdrc.org/publication/career-and-technical-education-current-policy-prominent-programs-and-evidence

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.

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 Report). American Institutes for Research. https://cteresearchnetwork.org/research/what-we-know-about-the-impact-of-cte

Malkus, N. (2019). *The evolution of Career and Technical Education 1982–2013*. https://www.aei.org/wp-content/uploads/2019/04/The-Evolution-of-Career-and-Technical-Education.pdf?x85095

Mihaly, K., Mulhern, C., Kennedy, K.E., Okuda-Lim, Z., Greer, L., Lee, J., Stevens, L., Mendoza-Graf, A., and Bellows, L. (2025). *Participation and Outcomes for Career and Technical Education Students in Nevada.* RAND, RR-A4176-1.

National Center for Education Statistics. (2021). Percentage of public and private high school graduates who earned at least one Carnegie credit in selected career/technical education courses in high school, by selected student and school characteristics: 2019 (Table 225.25). Digest of Education Statistics. https://nces.ed.gov/programs/digest/d21/tables/dt21_225.25.asp

National Governors' Association. (2020). *State Strategies to Scale Work-Based Learning: Lessons Learned from a NGA Policy Academy*. https://www.nga.org/wp-content/uploads/2020/02/NGA_Work-Based-Learning_Guide_final_web.pdf

Neumark, D., & Rothstein, D. (2006). School-to-career programs and transitions to employment and higher education. *Economics of Education Review, 25(4), 374–391.* https://doi.org/10.1016/j.econedurev.2005.07.011

Prising, J. (2020). *The skills gap: How employers can bridge the divide*. McKinsey & Company. https://www.mckinsey.com/featured-insights/future-of-work/the-skills-gap-how-employers-can-bridge-the-divide

Rosen, R., Alterman, E., Treskon, L., Parise, L., Dixon, M., & Wuest, C. (2023). P-TECH 9-14 Pathways to Success. MDRC. https://www.mdrc.org/sites/default/files/P-TECH_Final_Report.pdf

Ross, M., Kazis, R., Bateman, N., & Stateler, L. (2020). *Work-based learning can advance equity and opportunity for America's young people.* Washington, DC: Brookings Institution.

Shields, K.A., Hutchins, B.C., Reese, K., Fletcher, E.C., & Hughes, K. 2024. *Building robust district work-based learning data collection systems*. CTE Research Network, American Institutes for Research. https://cteresearchnetwork.org/sites/default/files/2024-03/District-WBL-DataSys-508.pdf

Society for Human Resource Management. (2019). *Employers say students aren't learning soft skills in college*. https://www.shrm.org/topics-tools/news/employee-relations/employers-say-students-arent-learning-soft-skills-college

Stern, D., Stone, J. R., Hopkins, C., McMillion, M., & Crain, R. (1994). School-based enterprise: Productive learning in American high schools. *University of California, Berkeley*.

Stern, D., Dayton, C., & Raby, M. (1998). Career academies: Building blocks for reconstructing American high schools. *University of California, Berkeley*.

Theodos, B., Pergamit, M., Hanson, D., Teles, D., Gerken, M., Thomas, K., Gedo, S. & Park, J. (2023). *Evaluation of the urban alliance high school internship program.* Washington, DC: Urban Institute.

Velasco, T, Fink, J., Bedoya-Guevara, M., and Jenkins, D. (2024). *The postsecondary outcomes of high school dual enrollment students: A national and state-by-state analysis.* Community College Research Center. https://ccrc.tc.columbia.edu/publications/postsecondary-outcomes-dual-enrollment-national-state.html

Wagner, M. M., Newman, L. A., & Javitz, H. S. (2016). The benefits of high school career and technical education (CTE) for youth with learning disabilities. Journal of Learning Disabilities, 49(6), 658–670.

Warner, M., Caspary, K., Arshan, N., Stites, R., Padilla, C., Patel, D., McCracken, M., Harless, E., Park, C., Fahimuddin, L., & Adelman, N. (2016). *Taking stock of the California Linked Learning District Initiative. Seventh-year evaluation report.* Menlo Park, CA: SRI International.

West Virginia Department of Education. (2018). *West Virginia simulated workplace Operational manual.* Retrieved July 28, 2025, from: https://wvde.us/sites/default/files/2018/01/2015-simulated-workplace-manual.pdf

Table 1. 12th Grader and School Characteristics in VE-Offering Schools versus Schools Never Offering VE

	Kern High School District	
	School never offered VE	School ever offered VE
11th grade reading score - standardized	-0.028	0.023
	(1.013)	(0.989)
11th grade math score - standardized	-0.023	0.019
	(1.008)	(0.993)
Unexcused absent days - prior year	0.706	0.644
	(1.985)	(1.919)
Received a suspension - prior year	0.063	0.055
	(0.244)	(0.228)
Race: African-American	0.045	0.064
	(0.206)	(0.244)
Race: White	0.231	0.177
	(0.421)	(0.381)
Race: Hispanic	0.660	0.684
	(0.474)	(0.465)
Race: Other	0.065	0.076
	(0.246)	(0.265)
Gender: Male	0.510**	0.491
	(0.500)	(0.500)
EL: Current	0.057	0.063
	(0.232)	(0.243)
Never EL: English only	0.587	0.519
	(0.492)	(0.500)
Special education student	0.085	0.089
	(0.279)	(0.284)
12th grade cohort size	433.9**	531.1
	(160.6)	(89.44)
Number of unique schools	17	10
	New York City	
	School never offered VE	School ever offered VE
Regents English score	-0.039	0.061
	(1.016)	(0.924)
Regents Algebra score	0.022	0.115
	(0.980)	(0.875)
Absent days – prior year	15.64**	13.17
	(23.75)	(20.81)
Race: African-American	0.293***	0.188
	(0.455)	(0.391)
Race: White	0.128**	0.195
	(0.334)	(0.396)
Race: Hispanic	0.395	0.356
	(0.489)	(0.479)
Race: Asian	0.158**	0.245
	(0.365)	(0.430)
Gender: Male	0.520	0.497
	(0.500)	(0.500)
EL: Current	0.102	0.083

	(0.302)	(0.277)
Special education student	0.195***	0.134
	(0.396)	(0.341)
Subsidized meal eligible	0.714	0.731
	(0.452)	(0.443)
12th grade cohort size	292.0***	595.5
	(320.7)	(312.0)
Number of unique schools	607	41

Notes: Standard deviations are given in parentheses. *, **, and *** imply that the mean for the VE-offering schools is statistically different than the mean for other schools at the 10, 5, and 1 percent level, respectively.

Table 2. VE Oversubscription and Factors Considered in Enrollment

	KHSD	NYCPS	Other Schools	Total
School has oversubscription	80.0%	12.5%	17.5%	18.6%
Number of students oversubscribed	17.5	34.0	17.0	18.4
CTE participation considered	20.0%	81.3%	54.6%	55.9%
Prerequisite coursetaking considered	20.0%	68.8%	50.3%	51.0%
Teacher preference and referrals considered	80.0%	62.5%	43.2%	45.6%
GPA considered	60.0%	31.3%	10.4%	13.2%
Number of unique schools	5	16	183	204

Source: RAND online survey of VE teachers, March 2022-May 2023.
Notes: The average number of oversubscribed students is reported only for schools reporting oversubscription. Factors considered in enrollment are not mutually exclusive (i.e., schools could choose all that apply).

Table 3. Student Characteristics by in 12th Grade: VE Participants versus Other Seniors

	Kern County High School District				
	Other seniors	VE-Takers	Difference: VE minus non-VE		
			(I)	(II)	(III)
11th grade reading score	0.017	0.603	0.586***	0.518***	0.342***
	(0.992)	(0.888)	(0.030)	(0.028)	(0.030)
11th grade math score	0.0145	0.679	0.665***	0.604***	0.401***
	(0.994)	(1.088)	(0.037)	(0.033)	(0.033)
% unexcused absent days - prior year	0.651	0.613	-0.039	-0.001	-0.026
	(1.876)	(1.931)	(0.054)	(0.054)	(0.063)
Received a suspension - prior year	0.0561	0.0251	-0.031***	-0.027***	-0.016***
	(0.230)	(0.157)	(0.004)	(0.004)	(0.005)
Race: African-American	0.0548	0.0434	-0.011**	-0.013**	-0.009
	(0.228)	(0.204)	(0.005)	(0.006)	(0.007)
Race: White	0.199	0.251	0.052***	0.042***	0.035***
	(0.399)	(0.434)	(0.012)	(0.010)	(0.012)
Race: Hispanic	0.675	0.576	-0.099***	-0.079***	-0.076***
	(0.468)	(0.494)	(0.013)	(0.011)	(0.014)
Race: Other	0.0711	0.129	0.058***	0.051***	0.050***
	(0.257)	(0.335)	(0.009)	(0.008)	(0.010)
Gender: Male	0.501	0.501	-0.001	0.006	-0.015
	(0.500)	(0.500)	(0.013)	(0.014)	(0.016)
EL: Current	0.060	0.012	-0.048***	-0.047***	-0.022***
	(0.237)	(0.109)	(0.003)	(0.003)	(0.004)
Never EL: English only	0.547	0.584	0.037***	0.030**	0.014
	(0.498)	(0.493)	(0.013)	(0.012)	(0.015)
Special education student	0.0883	0.00641	-0.082***	-0.083***	-0.050***
	(0.284)	(0.0798)	(0.002)	(0.003)	(0.004)
School fixed effects			No	Yes	Yes
Course-taking in grades 9 through 11			No	No	Yes
Number of students	105,979	1,404	107,383	107,383	107,383
	New York City				
	Other seniors	VE-Takers	Difference: VE minus non-VE		
			(I)	(II)	(III)
Regents English score	-0.011	0.314	0.325***	0.271***	0.087***
	(0.995)	(0.717)	(0.010)	(0.010)	(0.012)
Regents Algebra score	0.049	0.276	0.228***	0.208***	0.074***
	(0.960)	(0.791)	(0.011)	(0.011)	(0.011)

Absent days – prior year	14.45	9.152	-5.298***	-4.209***	-1.030***
	(21.68)	(12.50)	(0.154)	(0.174)	(0.203)
Race: African-American	0.273	0.197	-0.076***	-0.009**	-0.013**
	(0.445)	(0.398)	(0.005)	(0.004)	(0.005)
Race: White	0.140	0.158	0.018***	0.009**	0.006
	(0.347)	(0.364)	(0.004)	(0.004)	(0.005)
Race: Hispanic	0.389	0.397	0.008	-0.040***	-0.021***
	(0.487)	(0.489)	(0.006)	(0.006)	(0.007)
Race: Asian	0.179	0.233	0.055***	0.039***	0.029***
	(0.383)	(0.423)	(0.005)	(0.005)	(0.006)
Gender: Male	0.508	0.509	0.001	0.015**	0.016**
	(0.500)	(0.500)	(0.006)	(0.006)	(0.008)
EL: Current	0.090	0.017	-0.073***	-0.058***	-0.013***
	(0.286)	(0.130)	(0.002)	(0.002)	(0.002)
Special education student	0.152	0.088	-0.065***	-0.056***	-0.029***
	(0.359)	(0.283)	(0.003)	(0.004)	(0.005)
Subsidized meal eligible	0.721	0.738	0.017***	-0.005	-0.008
	(0.449)	(0.440)	(0.005)	(0.005)	(0.007)
School fixed effects			No	Yes	Yes
Course-taking in grades 9 through 11			No	No	Yes
Number of students	690,373	7,528	697,901	697,901	697,901

Notes: Standard deviations are given in parentheses. *, **, and *** imply that the mean for the VE-takers is statistically different than the mean for other seniors at the 10, 5, and 1 percent level, respectively.

Table 4. Differences in Prior High School Course-taking Between VE-Takers and Other Seniors: VE-Offering Schools

		Kern High School District	
		Other seniors	VE-Takers
Took a CTE course			
	11th grade	0.382***	0.658
		(0.486)	(0.475)
	10th grade	0.199	0.177
		(0.399)	(0.382)
	9th grade	0.619***	0.546
		(0.486)	(0.498)
Took a business CTE course			
	11th grade	0.027***	0.417
		(0.162)	(0.493)
	10th grade	0.006**	0.018
		(0.078)	(0.133)
	9th grade	0.019***	0.044
		(0.137)	(0.206)
Took an honors or AP course			
	11th grade	0.483***	0.733
		(0.500)	(0.443)
	10th grade	0.277***	0.481
		(0.447)	(0.500)
	9th grade	0.103**	0.139
		(0.303)	(0.346)
	Number of students	11,753	617
		New York City	
		School never offered VE	School ever offered VE
English language arts credits earned			
	11th grade	2.256***	2.207
		(0.931)	(0.800)
	10th grade	2.208***	2.138
		(0.837)	(0.538)
	9th grade	2.407	2.413
		(1.028)	(0.874)
Social studies credits earned			
	11th grade	2.375***	2.338
		(0.989)	(0.825)
	10th grade	2.282***	2.229
		(0.896)	(0.680)
	9th grade	2.025	2.042
		(0.768)	(0.633)
Math credits earned			
	11th grade	1.941***	2.052
		(0.820)	(0.699)
	10th grade	2.014***	2.094
		(0.715)	(0.595)
	9th grade	2.086***	2.303
		(0.783)	(0.817)
Science credits earned			

	11th grade	2.091***	2.010
		(0.983)	(0.690)
	10th grade	2.075***	2.040
		(0.799)	(0.499)
	9th grade	2.076***	2.050
		(0.790)	(0.474)
Foreign language credits earned			
	11th grade	1.222***	1.046
		(1.044)	(1.025)
	10th grade	1.528***	1.350
		(0.973)	(0.976)
	9th grade	1.523***	1.455
		(1.135)	(1.055)
Arts credits earned			
	11th grade	1.074***	0.532
		(1.302)	(0.888)
	10th grade	0.998***	0.467
		(1.220)	(0.812)
	9th grade	1.098***	0.952
		(1.082)	(1.016)
Business and tech credits earned			
	11th grade	0.451***	2.083
		(0.991)	(1.297)
	10th grade	0.438***	1.677
		(0.945)	(1.070)
	9th grade	0.251***	0.653
		(0.648)	(0.911)
Career development credits earned			
	11th grade	0.157	0.127
		(0.795)	(0.447)
	10th grade	0.092	0.132
		(0.526)	(0.476)
	9th grade	0.060	0.137
		(0.328)	(0.463)
Number of students		53,396	5,605

Notes: Standard deviations are given in parentheses. *, **, and *** imply that the mean for VE-takers is statistically different than the mean for other seniors at the 10, 5, and 1 percent level, respectively.

Table 5. Differences in Baseline Work Exposure, VE-Takers versus Other Seniors

	Kern High School District	
	Other seniors	VE-Takers
Worked for pay since starting 9th grade	0.416***	0.547
	(0.493)	(0.500)
Currently working for pay	0.119***	0.250
	(0.324)	(0.435)
Hours per week currently working for pay	14.95	12.59
	(10.16)	(7.967)
I have worked for pay at a job that is closely related to the job I want to have	0.148	0.157
	(0.356)	(0.367)
Has your parent or guardian owned a business?	0.273	0.336
	(0.446)	(0.474)
Number of surveyed students	2,329	128
	New York City	
	Other seniors	VE-Takers
Worked for pay since starting 9th grade	0.651	0.623
	(0.477)	(0.487)
Worked for pay during school year since starting 9th grade	0.562	0.507
	(0.497)	(0.504)
Hours per week currently working for pay	13.21	14.56
	(9.809)	(7.754)
I have worked for pay at a job that is closely related to the job I want to have	0.184	0.113
	(0.388)	(0.318)
Has your parent or guardian owned a business?	0.356	0.412
	(0.479)	(0.495)
Number of surveyed students	419	114

Notes: Standard deviations are given in parentheses. *, **, and *** imply that the mean for VE-takers is statistically different than the mean for other seniors at the 10, 5, and 1 percent level, respectively.

Table 6. Differences in Baseline Work-Based Learning Experiences, VE-Takers versus Other Seniors

	Kern High School District	
	Other seniors	VE-Takers
Attended a career day or job fair	0.343***	0.477
	(0.475)	(0.501)
Took a career interest survey	0.673*	0.750
	(0.469)	(0.435)
Took a tour of a workplace	0.355***	0.469
	(0.479)	(0.501)
Shadowed someone on the job	0.243***	0.359
	(0.429)	(0.482)
Completed a school project for a client	0.143*	0.195
	(0.350)	(0.398)
Ran a school business	0.086***	0.320
	(0.281)	(0.468)
Participated in a CTSO	0.137**	0.211
	(0.344)	(0.410)
Participated in an internship or co-op	0.144***	0.344
	(0.351)	(0.477)
Participated in an apprenticeship	0.096	0.102
	(0.295)	(0.303)
Earned an industry-recognized certification or license	0.124	0.172
	(0.330)	(0.379)
Number of surveyed students	2,329	128
	New York City	
	Other seniors	VE-Takers
Attended a career day or job fair	0.505	0.570
	(0.501)	(0.497)
Took a career interest survey	0.752	0.789
	(0.432)	(0.409)
Took a tour of a workplace	0.341**	0.465
	(0.475)	(0.501)
Shadowed someone on the job	0.246	0.281
	(0.431)	(0.451)
Completed a school project for a client	0.112***	0.254
	(0.316)	(0.437)
Ran a school business	0.076***	0.465
	(0.266)	(0.501)
Participated in a CTSO	0.043***	0.167
	(0.203)	(0.374)
Participated in an internship or co-op	0.332	0.412
	(0.471)	(0.494)
Participated in an apprenticeship	0.100	0.140
	(0.301)	(0.349)
Earned an industry-recognized certification or license	0.126	0.158
	(0.333)	(0.366)

Number of surveyed students	419	114

Notes: Standard deviations are given in parentheses. *, **, and *** imply that the mean for VE-takers is statistically different than the mean for other seniors at the 10, 5, and 1 percent level, respectively.

Table 7. Differences in Baseline College Preparation Activities and Future Plans, VE-Takers versus Other Seniors

	Kern High School District	
	Other seniors	VE-Takers
Talked with a high school counselor about options	0.712	0.680
	(0.453)	(0.468)
Took a tour or attended an orientation program	0.416***	0.680
	(0.493)	(0.468)
Searched the Internet or read materials on colleges	0.756***	0.891
	(0.430)	(0.313)
Took a college admission exam	0.274***	0.500
	(0.446)	(0.502)
Took a course that counted for college credit in high school	0.724***	0.926
	(0.447)	(0.264)
Expecting to continue education	0.773***	0.938
	(0.419)	(0.243)
Expecting to take steps to start a business	0.229*	0.333
	(0.420)	(0.476)
Number of surveyed students	2,329	128
	New York City	
	Other seniors	VE-Takers
Talked with a high school counselor about options	0.699	0.693
	(0.459)	(0.463)
Took a tour or attended an orientation program	0.563	0.500
	(0.497)	(0.502)
Searched the Internet or read materials on colleges	0.940***	0.860
	(0.237)	(0.349)
Took a course to prepare for a college admission exam	0.668	0.746
	(0.471)	(0.437)
Took a college admission exam	0.947	0.930
	(0.224)	(0.257)
Expecting to continue education	0.938	0.894
	(0.242)	(0.309)
Number of surveyed students	419	114

Notes: Standard deviations are given in parentheses. *, **, and *** imply that the mean for VE-takers is statistically different than the mean for other seniors at the 10, 5, and 1 percent level, respectively.

Table 8. Differences in Baseline College and Career Readiness, VE-Takers versus Other Seniors

	Kern High School District	
	Other seniors	VE-Takers
Academic Motivation	3.928***	4.109
	(0.621)	(0.602)
Entrepreneurial Self Efficacy	3.670***	4.000
	(0.634)	(0.593)
College and Career Readiness	3.939***	4.263
	(0.676)	(0.505)
Financial Literacy NPSAS Sum: total 3	1.414***	1.773
	(0.903)	(0.898)
Leadership NOCTI Sum: total 12	6.607***	8.422
	(3.025)	(2.595)
Professionalism NOCTI Sum: total 8	4.012***	5.086
	(2.143)	(2.166)
Number of surveyed students	2,329	128
	New York City	
	Other seniors	VE-Takers
Academic Motivation	3.970*	3.858
	(0.562)	(0.667)
Entrepreneurial Self Efficacy	3.650	3.712
	(0.623)	(0.660)
College and Career Readiness	3.951	3.932
	(0.562)	(0.621)
Financial Literacy NPSAS Sum: total 3	1.697**	1.965
	(1.047)	(1.113)
Leadership NOCTI Sum: total 12	7.625	8.026
	(2.931)	(3.064)
Professionalism NOCTI Sum: total 8	4.737	4.728
	(2.436)	(2.247)
Number of surveyed students	419	114

Notes: Standard deviations are given in parentheses. *, **, and *** imply that the mean for VE-takers is statistically different than the mean for other seniors at the 10, 5, and 1 percent level, respectively.

Table 9. Regression-Adjusted Differences in Baseline Survey Responses by VE Status, Kern High School District

	Difference: VE-Takers minus other seniors				
	(I)	(II)	(III)	(IV)	(V)
Baseline work exposure					
Worked for pay since starting 9th grade	0.142***	0.162***	0.154***	0.153***	0.123**
	(0.046)	(0.047)	(0.047)	(0.047)	(0.051)
Currently working for pay	0.126***	0.134***	0.131***	0.140***	0.115***
	(0.040)	(0.040)	(0.040)	(0.040)	(0.040)
Work-based learning experiences					
Attended a career day or job fair	0.121***	0.126***	0.126***	0.124***	0.109**
	(0.047)	(0.047)	(0.047)	(0.047)	(0.050)
Took a career interest survey	0.093**	0.080**	0.071*	0.032	0.021
	(0.040)	(0.040)	(0.040)	(0.041)	(0.043)
Took a tour of a workplace	0.092**	0.088**	0.091**	0.095**	0.088*
	(0.047)	(0.045)	(0.045)	(0.045)	(0.049)
Shadowed someone on the job	0.113**	0.099**	0.103**	0.111**	0.101**
	(0.045)	(0.044)	(0.044)	(0.044)	(0.047)
Participated in a CTSO	0.070*	0.075**	0.081**	0.095**	0.115***
	(0.038)	(0.038)	(0.038)	(0.038)	(0.041)
Participated in an internship or co-op	0.212***	0.202***	0.208***	0.207***	0.214***
	(0.044)	(0.042)	(0.042)	(0.043)	(0.044)
College preparation activities and future plans					
Took a tour or attended an orientation program	0.264***	0.259***	0.249***	0.195***	0.206***
	(0.044)	(0.044)	(0.044)	(0.045)	(0.047)
Searched the Internet or read materials on colleges	0.145***	0.117***	0.109***	0.070**	0.067**
	(0.029)	(0.029)	(0.029)	(0.029)	(0.034)
Took a college admission exam	0.230***	0.192***	0.187***	0.103***	0.096**
	(0.047)	(0.043)	(0.044)	(0.040)	(0.041)
Took a course that counted for college credit in high school	0.180***	0.176***	0.150***	0.082**	0.090*
	(0.040)	(0.041)	(0.043)	(0.037)	(0.049)
Expecting to continue education	0.161***	0.132***	0.121***	0.075***	0.099***
	(0.024)	(0.026)	(0.026)	(0.026)	(0.029)
College and career readiness					
Academic Motivation	0.187***	0.174***	0.175***	0.138**	0.122*
	(0.057)	(0.057)	(0.057)	(0.058)	(0.062)
Entrepreneurial Self Efficacy	0.329***	0.322***	0.320***	0.298***	0.288***
	(0.055)	(0.055)	(0.055)	(0.055)	(0.061)
College and Career Readiness	0.329***	0.297***	0.284***	0.205***	0.196***
	(0.047)	(0.049)	(0.050)	(0.051)	(0.055)
Financial Literacy NPSAS Sum: total 3	0.367***	0.333***	0.317***	0.147*	0.099

	(0.084)	(0.083)	(0.083)	(0.082)	(0.090)
Leadership NOCTI Sum: total 12	1.819***	1.611***	1.458***	0.768***	0.591**
	(0.246)	(0.248)	(0.248)	(0.239)	(0.260)
Professionalism NOCTI Sum: total 8	1.024***	0.864***	0.786***	0.303	0.180
	(0.204)	(0.204)	(0.205)	(0.187)	(0.201)
Student demographics	No	Yes	Yes	Yes	Yes
English learner and special education status	No	No	Yes	Yes	Yes
Prior test scores, absences, and suspensions	No	No	No	Yes	Yes
Prior courses taken	No	No	No	No	Yes

Notes: The first column presents the estimated difference in survey responses between VE-takers and other seniors, with robust standard errors given in parentheses, without controlling for any covariates. The second column introduces student demographics; the third column introduces English learner and special education status; the fourth column introduced prior test scores, absences, and suspensions; and the last column introduces prior courses taken as covariates. *, **, and *** implies statistical significance at the 10, 5, and 1 percent level, respectively.

Appendix Table 1. Baseline Response Rates from Kern High School District and New York City Public Schools

	Kern County High School District					
	Cohort 1			Cohort 2		
School Name	Total	Complete	Response Rate	Total	Complete	Response Rate
Arvin HS	675	200	29.6%	675	257	38.1%
Bakersfield HS	722	354	49.0%	640	385	60.2%
South HS	539	336	62.3%	473	258	54.5%
Stockdale HS	557	284	51.0%	579	302	52.2%
Total Kern	2493	1174	47.1%	2367	1202	50.8%
				New York City		
Francis Lewis HS	-	-	-	1042	396	38.0%
HS of Econ & Fin	-	-	-	176	68	38.6%
Total NYCPS	-	-	-	1218	464	38.1%