THE UNIVERSITY OF CHICAGO

# CAREER AND TECHNICAL EDUCATION IN THE ERA OF COLLEGE AND CAREER READINESS: INFLUENCES ON YOUTH POSTSECONDARY ASPIRATIONS IN "OAKSBURG, USA"

A DISSERTATION SUBMITTED TO

THE FACULTY OF THE DIVISION OF THE SOCIAL SCIENCES

IN CANDIDACY FOR THE DEGREE OF

DOCTOR OF PHILOSOPHY

DEPARTMENT OF COMPARATIVE HUMAN DEVELOPMENT

BY

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CHICAGO, ILLINOIS

JUNE 2021

For my mother

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**Acknowledgements**

I am deeply grateful for the support I have received from a number of people over the course of researching and writing this dissertation.

My dissertation co-chair, Guanglei Hong, has never doubted my abilities to learn and grow as a researcher. From the start of my time as a graduate student, she has often expressed higher expectations of me than I would otherwise have developed for myself. I am appreciative of her constant willingness to listen carefully to my ideas, to help me structure my thinking about the relationships between theory and method, and to encourage me at every stage of the dissertation process.

Andrew Abbott, who also served as co-chair, exposed me to a wide range of sociological literature that provided the impetus for how I framed my research questions. I am thankful for his willingness to share his expertise not only on topics relevant to this study, but also on how to imagine research problems in new ways and interpret findings through various possible lenses. Conversations with him always leave me eager to explore additional theories and types of data analysis.

Richard Shweder, in his own work and through his conversations with me over the course of my time in graduate school, has inspired me to tackle social problems even if they may not have a satisfactory solution, and in fact to view such issues not as demotivating but instead as exciting in their potential to galvanize new forms of thought. I am grateful for his confidence in me to take on and do justice to such issues in my own work.

James Rosenbaum, whose work inspired my interest in the linkages between schools and the world of work, graciously took on the role of committee member after I approached him quite out of the blue. Regular conversations with him served as an intellectual springboard as I

developed this project, and I am thankful that he challenged me to expand the study in ways that greatly improved its scope and validity.

In addition to my committee members, I owe a deep debt of gratitude to a number of scholars who provided feedback on various stages of this dissertation. Conversations with Lisa Rosen, Charles Payne, John Lucy, Kai Schafft, and Katherine Newman were instrumental in helping me to define the goals of this study and design appropriate methods. Lily Ye and Aron Marie gave invaluable advice on the organization and clarity of each chapter, and they continually provided motivation and friendship during the writing process.

I was fortunate to have two outstanding research assistants, Minyoung Do and Charis Stanek, who dedicated themselves to this project's qualitative analyses. Their insights on emergent themes during the analysis process contributed to the development of thematic categories. Editing by Katherine from Scribbr improved the clarity of this text.

I am grateful to the Department of Comparative Human Development, my home at the University of Chicago, where my ideas have been met with encouragement and support from faculty and students alike, and where I have been challenged to both expand my methodological and theoretical repertoire and precisely carve out my own scholarly contributions. Thank you to my fellow cohort members and other students of the department, including Lorna Hadlock, Paula Martin, Emily Wilson, and Raffaella Seymour-Taylor, Seamus Power, Sanja Miklin, and Helen Lee, for their friendship and advice.

I also found belonging and inspiration in the University of Chicago's education research community. Its regular workshops and meetings, where we grappled with various theoretical and methodological approaches to the study of education, were integral to the development of this project. I am particularly grateful to Elaine Allensworth and others at the UChicago Consortium

on School Research for so effectively modeling research grounded in the concerns of practice, which this study has aimed to emulate.

I would like to express my appreciation to my family. My parents, Jim and Mary Cashdollar, provided me with the encouragement and freedoms to explore my interests, whatever they were, at every stage of my development. Those experiences instilled the desire to understand how to ensure all youth experience such supports. My mother, to whom this dissertation is dedicated, has transformed some of her own goals into the championship of mine. My husband, Kyle Kauffman, was my sounding board and thought partner at every stage this project. His understanding and belief in me have been unwavering, and his ongoing encouragement contributed to making the researching and writing of this dissertation the enjoyable process that it was.

This dissertation has been generously supported by the Institute of Education Sciences, US Department of Education, which provided funding for my graduate study and research through grant number R305B140048 at the University of Chicago. The Successful Pathways from School to Work initiative of the University of Chicago, funded by the Hymen Milgrom Supporting Organization (HMSO), provided a major grant for this dissertation. This work was also supported by grants and fellowships from the Stigler Center for the Study of the Economy and the State by the Booth School of Business at the University of Chicago; the University of Chicago Social Sciences Division, the Gianinno Graduate Research Fund, the Bernice Neugarten Scholarship Endowment, and the Robert and Shirley Valett Gift. I am grateful to these organizations and the people within them for enabling this work.

Above all, I thank the participants in this study, who welcomed me into their organizations and their lives. The Oaksburg community takes deep pride in its commitment to

supporting its youth, and this enthusiasm extended to my project and its potential to share lessons with other communities. I thank the education stakeholders who talked with me, invited me to observe their efforts, and connected me with their neighbors and colleagues. I also would like to express my sincerest gratitude to the young people who participated in this study. Their trust in me and their willingness to share their experiences, beliefs, and goals made this work possible and worthwhile.

## Abstract

The organizing ideal of educational equity in U.S. public schools, premised on ensuring that all students have equal opportunities to attain the highest levels of achievement, has most recently manifested as efforts by policymakers and practitioners to promote "college and career readiness." These efforts reflect the goal of maintaining students' access to bachelor's and advanced degrees, while simultaneously ensuring that those who do not achieve these degrees have access to other forms of quality career training (e.g., associate degrees, apprenticeships, on-the-job training). Career and technical education (CTE), a model of vocational education that integrates high-quality academic learning, has become central to these efforts due to its emphasis on preparation for sub-baccalaureate career pathways.

However, the increasing popularity and decentralized spread of CTE nationally has led to variation in how educators understand its goals, with unknown implications for program design and student outcomes. Some scholars of education and sociology have expressed concern that CTE's success at preparing students for sub-baccalaureate education and work may come at the expense of rigorous preparation for four-year college, inadvertently reproducing tracking between academic and CTE coursework. Drawing on sensemaking and vocational development frameworks, this dissertation reveals how ideals of equity are manifest by educational stakeholders as they make sense of and implement CTE, and it analyzes implications for student experiences and aspirations.

Findings are derived from a case study in a semi-rural manufacturing region of Pennsylvania that I call "Oaksburg." I conducted semi-structured interviews with 52 educational stakeholders, including comprehensive high school administrators, school counselors, local employers, apprenticeship instructors, and members of postsecondary readiness and workforce

development groups who worked with school partners to develop CTE programs. I spent 114 hours observing meetings between these stakeholders as well as student college and career readiness events. I also administered a survey on aspirations and vocational development to 1,200 students at "Oaksburg High School," analyzing the differences between CTE concentrators in manufacturing and construction ("trades concentrators"), students who spent a great deal of time preparing for four-year college ("college concentrators"), and students with little engagement in postsecondary preparation ("non-concentrators").

I show that educational stakeholders purposefully framed CTE as separate from academic learning, contradicting CTE policy goals and challenging notions of equity based on expanding bachelor's degree attainment. Stakeholders aimed to portray vocational learning as equal in status to traditional academic coursework, worthy of pursuit in its own right rather than a backup option or a supplement to college-prep activity. I argue that this understanding of CTE's goals reflects school leaders' shifting ideals of educational equity in response to changes in the local economic opportunity structure. However, in their well-intentioned efforts to elevate the status of CTE, education stakeholders often inadvertently painted an unrealistic picture of how much students could expect to earn with sub-baccalaureate degrees relative to bachelor's degrees.

The survey data reveal that, although trades concentrators had lower educational aspirations than their demographically similar peers, they also had strong vocational identity and career maturity compared to other students. At the same time, they overestimated how much they could expect to earn in sub-baccalaureate careers. These findings suggest that lower rates of four-year college enrollment among CTE students reflect aspirations for sub-baccalaureate careers that are relatively well-developed, but potentially based on overly optimistic expectations of future income. Non-concentrators, who were disproportionately low-income and racial/ethnic

minority students, had the lowest levels of vocational development. These findings point to the need for expanded efforts to communicate accurate information about careers and provide students with opportunities to explore them, which would enhance support for young people to achieve the goals they set for themselves.

# CHAPTER 1: INTRODUCTION

As educators and policymakers grapple with the need to prepare youth for careers in a technologically advancing economic landscape, enthusiasm is growing nationwide for career and technical education (CTE). The relabeling of vocational education as "CTE" signals a transition from the low-quality job training for non-college-bound students that characterized vocational programs of the past. Instead, the CTE model combines broad technical learning with high academic rigor and an increased emphasis on readiness for postsecondary education. As imagined by policymakers, CTE provides pathways for students to pursue a range of in-demand postsecondary certificates, associate degrees, and other sub-baccalaureate credentials in addition to bachelor's degrees (BAs). At the same time, CTE has been hailed as an alternative to "college for all" (CFA) approaches to educational equity, which have been criticized as upholding an overly narrow vision of postsecondary success premised on BA attainment (Rosenbaum, 2001; Rosenbaum et al., 2017).

The growing interest in and support for CTE in the education community has prompted calls for research into CTE outcomes and spurred a new federal CTE research network (Institute for Education Sciences, 2018). Researchers have emphasized the need to assess whether the new CTE programs are meeting college- and career-readiness goals for CTE concentrators. This group comprises students who take at least three credits in a CTE program of study, representing approximately one in five high school students nationally (Liu & Burns, 2020). In turn, a growing number of causal studies have analyzed the postsecondary impacts of high-school CTE programs. This body of work has found positive impacts on work-related outcomes, including employment and earnings, in the years following high school (Brunner et al., 2019; Dougherty, 2016, 2018a; Dougherty et al., 2018; Rabren et al., 2014; Theobald et al., 2019). At the same

time, CTE has been shown to have mixed impacts on students' preparation for higher education, with some programs reducing enrollment in four-year colleges (Brunner et al., 2019; Cowan et al., 2019; Dougherty, 2018a; Giani, 2019; Witzen, 2019).

While causal impact studies are enhancing understanding of how CTE shapes students' postsecondary outcomes, they leave interpretation of these outcomes up for debate. Some researchers assume that reduced four-year college enrollment indicates that CTE students are receiving inadequate academic support and/or have been subject to low expectations (e.g. Haycock, 2011; Sutton, 2017). However, others argue that, by design, CTE exposes students to a wide array of postsecondary learning opportunities, and in some cases, pursuing four-year college alternatives will better support students' long-term career goals (Newman & Winston, 2016; Rosenbaum et al., 2017; Symonds et al., 2011). Missing from these debates is research into the educational and career aspirations of CTE students themselves, particularly those who do not plan to attend a four-year college. The extent to which such students perceive the pursuit of a BA to be overly daunting or unrealistic, and/or whether they indeed aspire to work in jobs that require preparation in the form of industry certificates, technical associate degrees, apprenticeships, or on-the-job experience, is unclear. It is also not well understood how CTE students draw on career-related information and experiences as they develop postsecondary aspirations, or whether their information sources paint a realistic picture of the career and educational pathways they are considering. More fundamentally, following decades of the CFA ideology, the scholarly community and the U.S. educational system more broadly lacks a coherent interpretation of what educational equity means when, by design, educational programs prepare different students for different postsecondary outcomes.

Further complicating interpretations of CTE's impacts, the rapid spread of CTE popularity and uptake means that, as programs are implemented in more wide-reaching settings, researchers have a limited grasp of how much variation exists in program design, participation, and outcomes. More so than other education reforms, CTE is characterized by its explicit commitment to meeting local community needs. We can expect that variation across CTE programs will be inextricably tied to variation in local opportunity structures, industry priorities, and school-community relationships, all of which shape the commitments made by those who implement CTE programs. Educators for wide-ranging CTE programs may seek to advance multiple goals that are in tension with one another or with broader CTE policy. These may include promoting equal opportunity while also supplying workers to meet the needs of economic structures that are deeply stratified. In the United States, educational opportunity is widely conceived of as providing access to upward social mobility, while capitalist economies require workers to fill all levels of the occupational hierarchy, including the bottom levels (Labaree, 1997).

Recognizing that CTE programs develop in the context of specific economic, cultural, and historical settings, this dissertation uses a case study approach to analyze CTE as practiced by educators and experienced by students in light of myriad intersecting local influences. Through the lens of the CTE movement, this empirical case study analyzes how educators and students negotiate the multiple goals of education as schools transition from CFA to a broader vision of postsecondary readiness. I pay particular attention to how they balance tensions in these goals as they take account of local opportunities and constraints. This work also reveals the implications of these shifting commitments for student outcomes, promoting new ideals of educational equity in some ways and potentially limiting equity in others.

## Overview

Central to the CTE model, as imagined by policymakers, is the goal of preparing students equally for four-year colleges and for other forms of postsecondary learning. This dual goal has emerged as modern CTE programs became tasked with solving two of the most pernicious problems in the history of the U.S. education system: tracking and degree inflation. Tracking along the axes of race and class has long been a consequence of the low-quality programs that have historically defined vocational education in the United States; and degree inflation has expanded, in part, due to efforts to combat tracking and expand educational opportunity to marginalized populations (Labaree, 1997). However, both phenomena have contributed to social reproduction and the exclusion of marginalized groups from the most lucrative and high-status careers.

### *College for All: An Imperfect Solution to Tracking*

The historically low esteem in which vocational education has been held in the United States arose from a confluence of unique historical and institutional factors. While nations such as Germany developed vocational training systems run jointly by regional governments, labor unions, and industry representatives, vocational education in the United States was run at its inception by educational professionals who lacked formal ties to industry and had little knowledge of employer needs. As a result, the degrees produced by these programs had little value to employers. In fact, the so-called vocational courses, divorced from industry, were underfunded and provided little in the way of either academic or vocational learning (Hansen, 2011). They soon came to be considered “dumping grounds” for students deemed to be not bound for college, who were disproportionately low in socioeconomic status and tended to be

members of marginalized racial and ethnic groups (Bowles & Gintis, 1976; Gamoran, 1996; Oakes & Guiton, 1995).

Growing recognition and critique of tracking practices culminated in efforts in the 1980s and 1990s to eliminate low-level coursework, including many vocational programs, and expand access to rigorous college-prep coursework for all students. This "college for all" (CFA) movement, as termed by Rosenbaum (2001), has led to substantial increases in the proportion of low-income and ethnic minority students enrolling in four-year colleges (McFarland et al., 2019). In fact, exploding college enrollment at the turn of the 21st century was driven almost entirely by low-income and ethnic minority students (Fry & Cilluffo, 2019). The emphasis on equal opportunity and the prolonged possibility for all to achieve, epitomized by CFA, accords well with American ideals of equality through "contest mobility" (Turner, 1960). According to Turner's classical theorization, the role of the school in the United States has been to ensure equal opportunity to compete in a winner-takes-all competition for a limited number of the most prestigious social positions. As a result, educational resources have been viewed as best allocated to helping students advance in this competition, rather than to providing learning opportunities for less prestigious careers. Through the CFA movement, the opportunity to advance toward high-status social positions through higher education has become a cornerstone of schools' formulation of educational opportunity.

Despite the strong resonance between CFA and equity ideals, in recent years, the national discourse on educational achievement has increasingly questioned whether college is still "worth it" (e.g., see Kerr, 2019; Shell, 2018; Tharp, 2018). Concern has grown particularly about the levels of debt taken on by students who enroll in four-year colleges. Even when tuition is heavily subsidized by scholarships and grants, enrolling in college creates a significant financial burden

for most low-income students (Huelsman, 2018). Fueling this perception that college may not be worth it is the long time-horizon required for college graduates to see a substantial return on their investments into BAs (Carnevale et al., 2011). This means that, in the early years of adulthood, at a time when many expect to achieve milestones such as home ownership and family formation (Silva, 2012), students who attend college are more likely to be paying off high debt loads.

However, the most concerning aspect of CFA, according to its critics, is that despite successful expansion of college enrollment, college graduation rates have remained stubbornly low for at-risk student populations (Newman & Winston, 2016; Rosenbaum et al., 2017; Symonds et al., 2011). Due to the financial, cultural, and information barriers they disproportionately face (Brock, 2010; Keels, 2020), fewer than half of the low-income students who enroll in four-year colleges go on to complete their degrees within 6 years (US Department of Education, 2018). These low graduation rates indicate that the most economically vulnerable students are the least likely to see a return on any investments they make in higher education.

### *Degree Inflation and Persistent Inequality*

Labor market researchers have also called into question whether the knowledge and skills conferred by a four-year college education are even necessary for many jobs that now stipulate a BA as a minimum educational qualification. As increasing numbers of students from disadvantaged groups obtain higher educational degrees, the minimum qualifications for elite careers correspondingly rise. Inspired by Max Weber's writing on status group competition and social closure, Randall Collins (1979) argued that this process of degree inflation allows well-resourced social groups to maintain monopolies over these careers, which stay out of reach for those with limited resources to invest into the increasing financial, social, and cultural capital that high-status credentials require. In turn, intergenerational rates of social mobility are

maintained over time, even as each successive generation gains higher levels of education than the last. This theory of credentialing along with similar signaling theories by economists are detailed in Appendix A.

The United States has seen an increasing proportion of workers with BAs who are underemployed, working in jobs for which degree requirements have increased but skill demands have not changed (Burning Glass, 2014; Fuller & Raman, 2017). Workers without BAs, who are primarily from economically disadvantaged and ethnic-minority backgrounds, increasingly face a wage penalty (Fuller & Raman, 2017). This group, representing over a third of the young adult population nationally, is relegated to low-wage labor primarily in the service sector, where they experience few benefits and high rates of employment instability (Abel & Deitz, 2014; Rosenbaum et al., 2017).

Despite its admirable intentions, CFA has come under scrutiny for contributing to degree inflation, continuing the cycle of excluding disadvantaged groups from equitable access to well-paying careers, even as their access to education increases (Brown & Bills, 2011; Labaree, 1997). Importantly, not all education systems have experienced credentialing over time to the extent found in the United States (Hansen, 2011; Shavit & Müller, 1998). Hansen (2011) explains how Germany's vocational certifications for well-paying middle-skill careers, developed and trusted by industry representatives, limit incentives for students to pursue ever-higher credentials in order to distinguish themselves. In the United States, industry representatives claim that many well-paying middle-skill jobs are facing worker shortages, which they attribute to schools' singular focus for so many years on preparing all students to pursue a four-year college degree (Carnevale et al., 2017; Rosenbaum et al., 2017; Symonds et al., 2011). They might point out, as James Coleman (1968, p. 7) put it decades ago, that "an [exclusively]

academic program in high school has not only the effect of keeping open the opportunities that arise through continued education, but also the effect of closing off opportunities that a vocational program keeps open."

European vocational systems often involve formally tracking students in ways that conflict with American contest mobility ideals. However, advocates of vocational education point to these systems as a lesson for the United States, demonstrating alternative ways of balancing opportunities for continued education with access to applied, marketable knowledge and skillsets for all students (Newman & Winston, 2016; Symonds et al., 2011). Through such advocacy, CTE has gained prominence as a potential solution to both tracking and degree inflation.

***CTE: Keeping All Doors Open?***

CTE is designed to take on these issues by 1) integrating a rigorous academic curriculum into vocational programs, ensuring all students have the foundation to pursue a four-year degree if they want to, while 2) providing high-quality career exploration and vocational learning to all students, preventing the re-establishment of separate college-bound and vocational tracks, while still providing pathways toward sub-baccalaureate degree options. The 2018 reauthorization of the Perkins Act (Perkins V) reflected this college and career-readiness goal. The legislation tied federal funding for CTE to increased academic accountability requirements, stronger links between high schools and postsecondary institutions, and improved partnerships with industry. The implicit goal is that, through CTE, schools provide all students with equal opportunity to pursue advanced educational credentials, without actually sending all students to four-year colleges. This is because some students will be expected to take the "off-ramps" provided by vocational training into middle-skill careers – careers that require more education than a high-

school diploma but less than a BA. In turn, according to CTE advocates, students can prepare for career pathways that align with their personal interests and goals, rather than chasing ever-rising degree thresholds.

### *Questioning Assumptions about Youth Goals*

In contrast to CTE advocates' view that some students will want to pursue BA alternatives, the standard expectation within the literature on education, sociology, and human development is that 21st century students' personal goals typically involve attaining a four-year college degree or higher. This literature largely assumes that youth who do not attain a four-year degree have faced a combination of roadblocks limiting their ability to enroll in or complete a BA program (Bozick & DeLuca, 2011). Indeed, a vast body of research has demonstrated that students preparing for, applying to, and completing courses in college do so on a wildly unequal playing field, with low-income and racial minority students facing numerous extra obstacles to BA attainment (for overviews, see Brock, 2010; Keels, 2013). Given this body of literature, skeptics have expressed concern that the routes CTE offers to a BA and beyond are less direct than those of the CFA approach (Holland, 2018; Payne, 2018). To suggest otherwise would be to underestimate the time and effort required to achieve the vocational expertise signified by occupational credentials, which are unlikely to count toward the credits required of majors in four-year degree programs (Newman & Winston, 2016). For marginalized students, who already face disproportionate obstacles in their pursuit of a BA, the accumulation of sub-baccalaureate credentials may act as stepping stones that encourage persistence toward more advanced degrees (Rosenbaum et al., 2017). Nonetheless, the extended timeline involved in this process may also discourage these students from pressing on. In other words, CTE could perform the function of "cooling out" (Clark, 1960), or gradually dissuading students, starting when they are in high

school, from acquiring the highest levels of education. Based on the research about the structural obstacles disadvantaged students face in their pursuit to attain higher educational degrees, it may be reasonable to assume that CTE students who do not earn BAs have faced structural disadvantages that have limited their ability to meet their goals, have cooled out their goals, or have prevented them from developing high goals in the first place.

Underlying this viewpoint is the recognition that, under conditions in which non-BA tracks were low-quality and dead-end, the vast majority of students would be expected to want to attain a BA if they could. However, high-quality CTE programs present new conditions in which students may not consider preparation for sub-baccalaureate careers to be a second-choice or low-status option. An important dimension of occupational status – high income – is not limited to careers that require a bachelor's or advanced degree. Due to variation in the returns to different educational credentials, some careers that require sub-baccalaureate credentials earn more than some careers that require BA degrees (Baum, Ma, & Payea, 2013; Carnevale, Strohl, Cheah, & Ridley, 2017). For example, 24% of workers with industry-certified occupational credentials (mostly certificates earned within several months or a year) earn more than the median BA holder (Carnevale et al., 2012). Additionally, some young people may have alternative preferences that outweigh occupational prestige. These preferences may involve pursuing a career that contributes to the social good, uses personal talents or captures personal interests, offers opportunities for professional growth, or provides the means to meet other goals, such as living close to family (Rosenbaum et al., 2017). Yet little work has examined how students make decisions when presented with a range of potential pathways to postsecondary education and career development, or whether these decisions support their long-term career goals. For this reason, educational researchers increasingly call for research that examines how

adolescents and young adults assess which educational and vocational pathways are realistic and worth pursuing (Dougherty, 2018b; Gottfried & Plasman, 2018; Rosenbaum et al., 2015).

This project will require attention to characteristics of the contexts in which youth career exploration and vocational development take place. CTE program design (including course sequences, curricula design, certifications offered, integration of academic content, opportunities for work-based learning, and other core features) exert major influences on the experiences and information that youth use to set postsecondary goals. As CTE becomes increasingly widespread and adapted to new contexts, these program features may begin to diverge from the model programs on which most CTE-impact research is based.

### *Variation in CTE Across Diverse Settings*

The passage of the federal "Every Student Succeeds Act" (ESSA) in 2015 accelerated the expansion of CTE's reach into new settings by increasing flexibility in how states measure and track college and career readiness. In turn, a number of states have changed their school performance measures and graduation requirements in ways that de-emphasize academic performance indicators and increase the weight of career-readiness measures. While such legislative changes have prompted schools to adopt more multifaceted standards of postsecondary readiness, these shifts may have some unintended consequences when implemented in schools. For example, some states allow districts to establish alternative graduation requirements for CTE students. Hodge and colleagues (2020) point out that this move could inadvertently create de facto tracks between vocational and traditional academic students. Additionally, CTE programs are increasingly being revitalized and expanded in comprehensive high schools, where the impacts of CTE are understudied. In fact, very little is known about how comprehensive high schools are implementing new CTE programs, since most CTE research has

taken place at dedicated vocational-technical high schools or with whole-school models in which all students participate in a CTE program of study (Hodge et al., 2020). Yet most students who experience CTE do so in a comprehensive high school setting (Liu & Burns, 2020). Comprehensive high schools are likely to have a great deal of variation between programs, perhaps more so than dedicated vocational-technical schools, given wide variation in the CTE funding they can provide and the relative immaturity of up-to-date CTE programs in many comprehensive schools. The CTE model imagined by policymakers, which prepares students equally for college and careers and keeps all doors open to students at all times, demands that schools carry out a careful balancing act. In turn, we can expect that different comprehensive high schools will prioritize the college and career preparation sides of the CTE coin in different ways. Understanding the contexts of youth postsecondary decision-making requires a much more detailed picture of how school leaders adapt the CTE model to their diverse settings.

**Research Questions**

This dissertation investigates how educator stakeholders understand the goals of CTE when implementing new programs and how their interpretations shape the contexts of student postsecondary decision-making through a case study of high schools in "Oaksburg," Pennsylvania. In the region I call Oaksburg, CTE enthusiasm is widespread among educators and industry leaders alike, and comprehensive high schools are making numerous efforts to revitalize their vocational programs. In carrying out this research, I asked the following questions:

1. How did educational stakeholders – including school administrators and counselors, industry partners, and representatives in workforce development – make sense of the goals of career and technical education (CTE)? To what degree were their interpretations consistent or inconsistent with federal and state CTE policy?

2. How did educational stakeholders communicate these interpretations to students and parents? In turn, how did they advise students and families on postsecondary planning?

3. What types of students participated in Oaksburg's most developed CTE pathways, and what shaped their aspirations for postsecondary education? Did CTE students with sub-baccalaureate aspirations assess BAs as unattainable, or did they believe their goals were better supported by alternative forms of postsecondary learning? How realistic and informed were these assessments, and how did they compare to the assessments of non-CTE students?

## Theoretical Framing

To answer these questions, I drew upon theoretical lenses from the sociology of education as well as adolescent development. A sociological sensemaking framework facilitated analysis of how school leaders, in partnership with local industry representatives, developed collective interpretations of CTE's goals and the problems related to workforce development and educational equity that it would theoretically solve. I then examined how these interpretations shaped the ways in which school leaders designed CTE programs and advised students and families on how to achieve success after high school. I drew upon an adolescent vocational development framework to understand how these redesigned school contexts shaped students' postsecondary aspirations and decision-making.

Researchers of school reform recognize that the implementation of reforms in response to policy is not a top-down process, as once theorized by the technical-rational perspective (Century & Cassata, 2016; Datnow et al., 2002). Instead, they show that reform is a local, contextualized, collective process in which actors at the school level interpret a reform's goals, mechanisms of change, and outcomes and then enact it based on these interpretations (Coburn, 2001, 2006; McLaughlin, 1990; Spillane et al., 2002). Administrators, school counselors, and others charged with leading CTE implementation have an important role to play in this adaptation process. According to sensemaking theory (Coburn, 2001; Spillane et al., 2002; Weick et al., 2005), as school leaders filter messaging from state policymakers and other authorities, their own priorities

and locally contextualized belief systems shape their interpretations of the most important facets of new reforms. Interactions with teachers, industry partners, and other colleagues further mold and recast reforms in light of local considerations (Coburn, 2001). In turn, understanding educator perspectives on CTE is increasingly important as its popularity and reach increase. Yet little is currently known about how comprehensive high school educators conceive of CTE's goals or intended design as they implement the new programs in which diverse students participate and undergo vocational development.

A rich psychological literature theorizes vocational exploration as an essential component of adolescent and young adult identity development (Erikson, 1968; Marcia, 1966; Zimmer-Gembeck & Mortimer, 2006). A running theme within the literature on vocational development has been a recognition of the ways in which experience and the contexts in which exploration takes place, rather than stable individual personality traits, shape vocational preferences and motivations (Schneider & Cook, 2015; Young, 1983; Zimmer-Gembeck & Mortimer, 2006). For most youth, the transition from school to work is not a single moment in time, but rather a gradual process with a great deal of temporal overlap, during which youth explore a range of occupational settings concurrent with various stages of education (Abbott, 2005). During this process, youth participate in family, school, and community settings that influence their vocational exploration, such as by providing information and enhancing motivation (Bronfenbrenner, 2001; Stone & Mortimer, 1998). An important outcome of career exploration processes is the development of career maturity, or readiness to make age-appropriate educational and occupational choices (Crites, 1973; Savickas, 1984; Super, 1955), as well as the development of vocational identity, or clarity and stability in one's goals, interests, and abilities (Holland, Johnston, & Asama, 1993). CTE and other career exploration programs seek to

improve vocational development by helping youth to develop postsecondary goals that are informed and stable, which in turn improves self-efficacy and long-term career outcomes (Anderson et al., 2016; Galvin et al., 2018; Honicke & Broadbent, 2016). Measures of career maturity and vocational identity – including the information that youth have about careers, the consistency in their career interests, and the alignment of their educational and career aspirations – are useful indicators of adolescent feelings of agency in their vocational decision-making processes. However, the influence of CTE on these measures of vocational development has not been studied, leaving researchers with little knowledge about the extent to which CTE students' postsecondary educational outcomes reflect their intended long-term goals.

This dissertation provides empirical data showing how educational stakeholders conceive of schools' commitments to students and the community in a changing economic landscape and how students set goals within the settings shaped by these commitments. In applying the sensemaking and vocational development frameworks to the phenomenon of CTE as implemented in one community, I am able to spotlight how locally contextualized interpretations, attitudes, and beliefs about college and careers shape students' ambitions to invest in various forms of educational and occupational credentials. In turn, these processes of sensemaking and vocational development are fundamental to the long-term outcomes of individual students, as well as the dynamics through which schools reproduce and/or mitigate social stratification.

**The Case Study Approach**

The design of this dissertation as a case study reflects the inseparability of adolescent vocational development within CTE programs from the broader communities and institutions in which those programs exist. Because case studies study phenomena in context, they are uniquely

suited to investigating topics that are inextricably tied to a specific place, time, or other distinct circumstances. These types of empirical investigations are able to answer research questions that interrogate not only the "what," but also the "how" and "why" of phenomena as they occur in the real world, rather than under controlled experimental (or quasi-experimental) conditions (Yin, 2003).

It follows that the findings from a case study may not hold true across other places and times. Yet it is precisely the findings' non-representative nature that creates the potential for in-depth understanding about the object of study. As Clifford Geertz points out in his argument for studying cultural particularities (Geertz, 1977, Chapter 2), when a complex phenomenon is inherently shaped by and dynamically developed within a particular context, then focusing only on the universal features of the phenomenon results in only the most superficial understanding of its nature. It would be possible to study adolescent development in CTE with a focus on program features that are most typical across a nationally representative sample. However, such a design would be unlikely to contribute much to our understanding of how and why youth develop the aspirations they do if the most defining features of CTE participation – such as the ways programs are shaped through local educator and employer networks, the efforts to make messaging about postsecondary success culturally salient, the historical changes in the highest-demand skills within the local economy – are not common across programs but particular. By focusing on the particulars of a case, we can better understand the underlying principles of why and how youth in CTE develop the aspirations they do than if we were to focus on the most apparent commonalities or differences across youth in different contexts. In this way, empirical evidence from in-depth local studies allow for the development of analytic generalizations (Yin,

2010), which can in turn guide large-scale studies of heterogeneity across settings or sub-populations within more broadly representative samples.

The unit of analysis in a case study is a bounded system (Merriam & Tisdell, 2015; Miles et al., 2013; Smith, 1978), and the bounded system in this study is the Oaksburg community. Community members of interest include those working to help youth successfully transition to the labor market (educators, employers, chamber of commerce members), as well as the youth themselves and their families. By studying this community as a whole, I was able to embed my analyses of CTE in the real-world network of high schools, businesses, institutions of higher education, and intermediary organizations that give shape to the particular understandings and design of CTE programs across the region.

After interviewing various educational stakeholders across the community, I narrowed in on one school in particular, Oaksburg High School (OHS), to analyze the relationships between students' coursework experiences in CTE and their postsecondary goals. Analyzing these relationships in-depth at one school allowed for a holistic account of how various facets of the school environment condition the ways students develop perceptions of their opportunities and aspirations for their futures as they participate in CTE and/or traditional academic coursework.

**Mixed-methods Research Design**

I employed a range of methods to collect data and analyze the role of CTE participation in youth vocational development in Oaksburg. These methods included interviews and observations of educational stakeholders across the region. At OHS, I also administered a survey on postsecondary education and career aspirations to groups of CTE and non-CTE students. Combining students' survey responses with their administrative records, I discovered how OHS students presented with a range of possible postsecondary trajectories understood their options

and made decisions about the education and career paths they would pursue. My analyses include both thematic coding and statistical analyses.

Using a research design that incorporated mixed methods for both data collection and analysis, this case study integrates the strengths of both quantitative and qualitative perspectives. Interviews and observations with education stakeholders provided information about how schools designed and implemented CTE programs, with implications for students' perceptions and experiences. Analysis of student surveys and student transcript records in turn revealed the ways these school contexts, in interaction with other developmental influences, related to students' ideas about education and work and their postsecondary aspirations. This approach – known as a "concurrent mixed-methods strategy" (Creswell, 2009; Small, 2011) – of simultaneously collecting both qualitative and quantitative data to integrate findings that answer different types of questions can provide broader perspectives than either qualitative or quantitative approaches alone. This is particularly true when quantitative patterns in the data can be enriched through qualitative description, when qualitative themes can be validated through quantitative data, and when qualitative themes in the data are irreducible to quantifiable measures (Morse, 1991). All of these conditions exist in the current study.

I took a pragmatic approach to integrating these perspectives, as the range of methods I used had both positivistic and phenomenological epistemological assumptions (Creswell, 2009; Miller & Nowacek, 2018; Scott & Briggs, 2009). As I answered my research questions, these methods allowed me to interrogate the following questions: what are the realities of Oaksburg's objective social contexts, opportunities, and constraints? How did participants make sense of these realities through dynamic interaction within their social contexts, and why did students develop specific educational and occupational aspirations?

The use of multiple qualitative methods also served to triangulate, or validate, findings (Denzin, 1978; Patton, 1999). While interviews provided in-depth accounts of participants' experiences and subjective perspectives, observations revealed the extent to which participants' actions and interactions with others were consistent with the views they expressed during interviews. Observations can also reveal tacit assumptions and logics expressed through interaction with others that are not explicitly stated during interviews (DeWalt & DeWalt, 2002; Emerson et al., 2011). Finally, seeking out multiple data sources (e.g., contacting counselors, principals, and superintendents to ascertain the views of educators) allowed me to corroborate information and identify multiple perspectives on the same topic or problem. By including multiple types of education stakeholders and youth in the study, I intended to both identify patterns of consistency between sources and understand the reasons for differences in perspectives as they related to the contexts of youth decision-making (Denzin, 1978; Patton, 1999).

**Chapter Summaries**

In the following chapter, Chapter 2, I provide context about the Oaksburg region as well as the specific Pennsylvania career education measures that Oaksburg schools were responding to and reinterpreting. I begin with an overview of the region's demographic and economic profile, highlighting the central role of the manufacturing industry in providing well-paying jobs for sub-baccalaureate workers and the "skills gap" this industry is facing. I then explain the economic motivations behind new legislative support for CTE in Pennsylvania, including changes that enabled a great deal of flexibility in how schools define and certify postsecondary readiness. With this economic and policy backdrop, I go on to describe how schools in the Oaksburg region have implemented the state's career education requirements and, through

partnership with local industry leaders, have taken initiative to revamp their CTE programs. I give particular attention to the changes to career education at OHS, including the new career and technology center (CTC) where students can participate in CTE programs of study in some of the region's leading industries (manufacturing, construction, and the trades). I return to OHS in Chapter 5, where I analyze the vocational identity development and aspirations of students who participate in these programs.

Chapter 3 delves into how the Oaksburg educational stakeholders responsible for the CTE revitalization at OHS and other schools made sense of CTE reform. The findings in this chapter are based on interviews with and observations of comprehensive high-school leaders, including superintendents, principals, assistant principals, and school counselors, along with school partners in industry and workforce development. Using a sensemaking framework, I show that the core CTE policy goal of ensuring that students are prepared for any level of higher education did not play a significant role in how local education stakeholders actually enacting CTE conceived of its purpose. Instead, they felt a primary goal was to help students explore and prepare for careers that did not require a four-year degree. At the most extreme, some school leaders went so far as to set a goal of having fewer graduates enrolling in four-year college. This goal is shocking from a progressive perspective, which over the course of the 20$^{th}$ century has conceived of educational equity as equal opportunity to pursue social mobility through higher education (Labaree, 1997).

I show that participants made sense of CTE's purpose in ways that differed sharply from the goals set out in policy due to a confluence of factors that led school leaders to consider their previous CFA efforts damaging to both students' prospects and local industry, while training for sub-baccalaureate careers became revered as a way to enrich both students and the community as

a whole. In turn, the expansion of postsecondary educational options became interpreted in Oaksburg not only as a way to increase the education levels of students who would otherwise enter the workforce with no postsecondary degrees, but also as a way to redirect a subset of students pursuing BAs into postsecondary pathways considered less financially risky for students and more relevant to local industries. Education leaders reconceptualized equality of educational opportunity not as leaving open doors to the highest levels of education, but instead as ensuring students had access to low-cost training for sub-baccalaureate careers with sustainable wages and opportunities for advancement.

This reconceptualization had implications for how schools allocated resources and categorized students. By expanding CTE coursework, building new CTE facilities, and partnering with industry leaders and community colleges to build state-approved programs of study, schools increased their investments into CTE students, whom they considered to be largely students who were not bound for college. While this distinction between college-prep and CTE coursework contradicted the goals of CTE policymakers, Oaksburg education stakeholders were not concerned about the prospect of cooling out students' four-year college prospects, since they felt sub-baccalaureate alternatives were equally respectable and potentially equally as lucrative.

The next chapter, Chapter 4, documents how school and industry leaders spread this perspective to students and parents. Challenging the BA as the benchmark of class-based merit, education stakeholders worked to increase social recognition of sub-baccalaureate work. They put forth a multidimensional construct of occupational prestige, challenging traditional prestige hierarchies based on education and income and instead valorizing occupations that made important social contributions while also providing lucrative wages. They pursued this

reimagining of occupational status via a number of strategies, including challenging beliefs about a tight correlation between education and income, sharing stories of graduates who attained high-earning jobs without BAs, and developing rituals and symbols to honor students pursuing sub-baccalaureate careers. However, in their enthusiasm for helping students rethink whether they actually needed to pursue a BA, education stakeholders sometimes exaggerated the long-term return on investment of pursuing a career in the trades, as opposed to a career that requires a bachelor's or advanced degree. This misleading information may have hampered students' development of informed postsecondary aspirations, undermining the school leaders' goal of prompting students to make more thoughtful postsecondary decisions based on realistic assessments of their options. In the following chapter, I assess just how informed and realistic the aspirations of students exposed to these CTE promotion efforts were.

Chapter 5 presents the results of a survey I administered at OHS. Conducting analysis of student survey responses through the lens of vocational identity development, I unpack the differences between the characteristics and aspirations of CTE trades concentrators (students who have taken a sequence of CTE coursework in manufacturing or construction) and those of other students. I show that trades concentrators were similar in terms of family socioeconomic status and ethnicity to students who invested substantial time in preparing for four-year college, but they were much more likely to be boys. Both of these "trades concentrator" and "college concentrator" groups were whiter and from higher-income families than "non-concentrators," students who indicated having done little exploration or preparation for any postsecondary trajectory. Through regression analyses and weighting techniques, I show that while trades concentrators had lower educational aspirations than their demographically similar college concentrator peers, they had well-developed vocational identities, as measured by their

commitment to particular career pathways, alignment between their career and educational goals, and self-reported knowledge about the occupations they have chosen to pursue. However, trades concentrators had inaccurate perceptions of how much they could expect to earn in middle-skill careers with sub-baccalaureate credentials, overestimating the earnings of these careers to a greater extent than either college concentrators or non-concentrators. These inaccurate estimations may reflect school contexts that exaggerated the earnings of careers in the trades. Based on these findings, I argue that trades concentrators' lower college aspirations were based not on feelings that they lacked the resources or ability to attain a BA, but rather on having explored sub-baccalaureate career options and feeling that these better supported their long-term goals. These results point to the need for theories of youth aspiration development that question contest mobility assumptions about what adolescents' educational end-goals are and should be. At the same time, they provide some support for concerns about CTE participation limiting students' information about college and its long-term financial payoff.

In the final chapter, I consider implications of the dissertation's findings and conclusions. A fundamental premise of this work is that schools' many commitments include the need to support students in developing and achieving goals that will help them acquire fulfilling higher learning experiences, careers, and lifestyles in the long-term. I reflect upon CTE's role in meeting this commitment by sharing stories of recent high school graduates, now working as apprentices in various trades. The experience of one recent graduate who had access to a highly developed CTE program in high school contrasts sharply with the experiences of older apprentices who attended high school during the CFA years. These stories provide an opportunity to evaluate, through the eyes of young adults directly impacted, how CTE access (or lack of access) during the high school years supported or obstructed their personal aspirations.

Looking forward, CTE is expected to continue to spread and evolve. Shortly after the completion of data collection for this dissertation, the COVID-19 pandemic wrought devastating impacts on the global economy, with widespread job losses especially concentrated in sectors dominated by low-educated workers. As the nation now looks to a post-pandemic future, policymakers are increasingly identifying CTE and other workforce development policy initiatives as integral to an economic recovery that alleviates pandemic-related worker displacement. Furthermore, bipartisan support is growing for laws that ensure sub-baccalaureate worker compensation reflects their vital role in enabling society to adjust to accelerating technological change and globalization. It will be the manifestation of these policy changes at the local level that shapes educators' sensemaking practices about schools' responsibilities to students and communities, with implications for students' opportunities to prepare for personally fulfilling, socially meaningful, and economically productive roles.

## CHAPTER 2: CASE STUDY CONTEXT

CTE's implementation and impacts on youth, like those of virtually all educational initiatives (Berman, 1980), are expected to vary considerably across school and community contexts. This is especially true for CTE due to its function, in part, as a way of meeting the needs of local labor markets. CTE programs are federally required to maintain ties with local industry and workforce development organizations, which differ in terms of industry size and sector across regions, states, and towns. Schools' partnerships with industry leaders and other community members to invigorate CTE programming – along with students' interpretations of the implications of CTE-related learning opportunities for their futures – cannot be separated from the broader economic, cultural, and historical facets of the community context in which schools are situated.

In this chapter, I provide details about facets of the Oaksburg community. I begin with an overview of the region's demographics and the state of local industry, with attention to the projected gap in qualified workers to meet labor market needs in the coming years. I describe the ways in which Pennsylvania legislators have attempted to address this "skills gap" in Oaksburg and other regions across the state, including new requirements and support for career education. I go on to explain how Oaksburg schools have responded to these legislative changes, drawing on and strengthening pre-existing partnerships with local industry leaders and workforce intermediaries to design programs that respond to local labor market needs. I conclude with additional details about student characteristics and career education efforts at "Oaksburg High School" (OHS), one of the schools in the region that has made substantial additions to its CTE programming in recent years. This school's CTE efforts served as a model to schools revamping their CTE programs throughout the region. The information in this chapter sets the backdrop for

how local school leaders interpreted community needs and how students made sense of local opportunity structures, which I will analyze in Chapters 3, 4, and 5.

**Regional Demographic and Economic Profile**

The Oaksburg region, which comprises several semi-rural counties in Pennsylvania, has a population of approximately 530,000 people. One in three people in the Oaksburg region live in rural areas, compared to fewer than one in five nationally. Like most regions across the United States that have a larger than average rural population, Oaksburg is whiter than the U.S. population on average. Non-Hispanic whites make up 84% of the Oaksburg population, compared to 60% of all Americans, as shown in Table 1. The remaining Oaksburg population is approximately 8% Hispanic or Latino, 4% Black or African American, and 3% two or more races (US Census Bureau, 2018a).

Table 1 also shows that the Oaksburg population is somewhat less educated than the U.S. population. However, median income is similar to the national median. Census data show that Oaksburgers' relatively high earnings result from higher-than-average returns to sub-baccalaureate degrees across the region.

While one in three Americans aged 25 years and older has earned a BA or higher, in the Oaksburg region the proportion is one in four. The non-BA holders in Oaksburg are also less educated than people with less than a BA nationally. While similar proportions of Oaksburgers and Americans hold an associate degree (just under 1 in 10), the Oaksburg region has a lower proportion of people with some college experience and a higher proportion of people with just a high school diploma (48% of Oaksburgers compared to 39% of all Americans hold no higher qualification than a high school degree; US Census Bureau, 2018b).

Table 1: Demographic Profile of the Oaksburg Region Compared to the U.S. Population

| | Oaksburg Region | USA |
|---|---|---|
| **Rural population** | 33% | 19% |
| **Ethnic/Racial composition** | | |
| Non-Hispanic white | 84% | 60% |
| Latino | 8% | 18% |
| African American | 4% | 12% |
| Two or more | 3% | 3% |
| **Education** | | |
| BA+ | | |
| Age 25+ | 25% | 33% |
| Age 25-34 | 28% | 36% |
| Age 45-64 | 25% | 31% |
| Sub-baccalaureate | | |
| Associate degree | 10% | 9% |
| Some college | 16% | 20% |
| High school diploma or equivalent | 39% | 27% |
| Less than high school | 10% | 12% |

SOURCE: US Census Bureau, 2010, 2018a, 2018b

Despite lower education levels in the Oaksburg region, per capita income is almost on par with the national average (US Census Bureau, 2018d), as shown in Table 2. This is in large part because Oaksburg workers' median earnings are higher than the national average for workers with less than a high-school diploma (5% higher), a high-school diploma or equivalent (14% higher), and some college or associate degree (8.5% higher; US Census Bureau, 2018b). Additionally, Oaksburg has a slightly higher labor-force participation rate than the U.S. average, for both men and women. Accordingly, the median household income in the Oaksburg region of approximately $64,000 is higher than the national median of $60,293. Furthermore, while 18% of U.S. children live in poverty, in Oaksburg the child poverty rate is approximately 12% (US Census Bureau, 2018d).

Given the higher returns to sub-baccalaureate credentials, combined with slightly lower returns to bachelor's and advanced degrees, the Oaksburg region has lower income inequality

than the national average. Income inequality is commonly measured by the Gini index, a measure of income distribution in which 1 represents complete inequality and 0 represents total equality across a population. In 2018, Oaksburg's Gini index was 0.43, compared with a national score of 0.49. Although income inequality in Oaksburg has risen in the past decade, it has done so at a rate similar to the national average. As a result, Oaksburg continues to be in the bottom quintile for income inequality nationally (US Census Bureau, 2018c).

Table 2: Economic Profile of the Oaksburg Region Compared to the United States

| | **Oaksburg Region** | **USA** |
|---|---|---|
| **Median returns to degree** | | |
| Graduate or professional degree | $69,770 | $72,492 |
| Bachelor's degree | $53,203 | $54,628 |
| Some college or associate degree | $38,961 | $36,854 |
| High-school diploma | $35,575 | $31,269 |
| Less than high school | $26,015 | $24,530 |
| **Earnings and poverty** | | |
| Per capita income | $31,000 | $32,621 |
| Median household income | $64,000 | $60,293 |
| Non-Hispanic white | $66,113 | $65,902 |
| Hispanic | $44,941 | $51,404 |
| Black | $48,000 | $41,511 |
| Total poverty | 8% | 13% |
| Child poverty | 12% | 18% |
| Gini index | 0.43 | 0.48 |

SOURCE: US Census Bureau, 2018d, 2018b, 2018c

The atypically high returns to sub-baccalaureate degrees in Oaksburg is due, in part, to its strong manufacturing industry, which provides a wage premium to workers with less than a BA. Across the United States, manufacturing is the dominant sector is just 15% of counties. Oaksburg is among those counties. Despite the presence of a number of multinational companies, the majority of manufacturers in the region are small or mid-sized companies that employ fewer than

100 people. The products manufactured cover a range of consumer and industrial goods, with a high proportion of companies in food production, specialty chemicals and plastics, industrial metals, and paper products. Sixteen percent of the Oaksburg population works in manufacturing (US Census Bureau, 2017), which is double the proportion of the national labor force (US Bureau of Labor Statistics, 2019a), as displayed in Table 3. Accordingly, the most overrepresented occupations[1] in the region are in production and occupations that support manufacturing. Combined, the data on Oaksburg's education, earnings, and employment patterns reveal just how central the manufacturing industry is to the livelihood of community members.

Despite this stronger-than-average manufacturing sector, overall manufacturing employment has declined dramatically since the 1960s and 1970s. In the past 30 years, the number of people employed in manufacturing across Oaksburg has declined by 33%, with about a fifth of the loss occurring since the Great Recession of 2008. These declines closely follow national trends. Since the 1990s, approximately a third of manufacturing jobs nationally have disappeared (US Bureau of Labor Statistics, 2019a), with the greatest declines seen in the types of small and mid-size companies that make up the bulk of the factories in Oaksburg.

While the number of manufacturing jobs has shrunk, Oaksburg manufacturers report having trouble finding employees to fill available jobs, echoing the concerns of manufacturers nationally (Carnevale, Ridley, et al., 2019; Charles et al., 2018). They argue that the co-occurrence of industry decline and labor demand has resulted from worker retirements and transfers, which has created job openings in manufacturing on par with job openings in growing

[1] While "industry" refers to the particular type of company, business, or employer for which a person works, "occupation" refers to the type of work a person does for that employer. For example, the construction industry employs not only construction laborers, but also supervisors, plumbers, electricians, building inspectors, administrative assistants, and others.

industries. In turn, the PA Department of Labor and Industry (2020) predicts continued job demand in Oaksburg manufacturing through 2026, even as the number of production occupations is expected to decline by 0.8%. Additionally, transportation and material moving occupations, integral to manufacturing supply chains, are expected to grow 9.6% by 2026, resulting in increased demand for occupations that already employ large numbers across the region. These include heavy and tractor-trailer truck drivers, industrial truck and tractor drivers, and hand packers.

Table 3: Occupational Profile of the Oaksburg Region Compared to the United States

| | **Oaksburg Region** | **USA** |
|---|---|---|
| **Industry employment** | | |
| Manufacturing | 16% | 8% |
| Healthcare | 14% | 14% |
| Retail | 12% | 11% |
| Warehousing & transportation | 5% | 4% |
| Construction | 7% | 6% |
| **Predicted 10-year percentage change in employment** | | |
| Production occupations | -0.8% | -5.0% |
| Healthcare occupations | 13% | 14% |
| Sales occupations | 3% | 0% |
| Transportation & material moving occupations | 10% | 4% |
| Construction occupations | 11% | 10% |

SOURCE: Pennsylvania Department of Labor and Industry, 2020; US Bureau of Labor Statistics, 2018; US Census Bureau, 2017

Table 3 also provides data on the other main industries in the Oaksburg region. These include healthcare and social assistance, which employs 14% of the working population, and retail trade, which employs 12% of workers (US Census Bureau, 2017). Both of these industries employ approximately the same proportion of local workers as the national average. Healthcare

practitioners and technical occupations, along with healthcare support occupations, are particularly in demand both locally and nationally. By 2026, some of the most in-demand occupations in healthcare and healthcare support in Oaksburg will be registered nurses, personal care aides, home health aides, and medical assistants. The construction industry is also expected to experience high demand in Oaksburg and across the United States (Pennsylvania Department of Labor and Industry, 2019).

The majority of the most regionally in-demand manufacturing, healthcare, and other occupations require some sort of postsecondary training or credential. Each year, the Pennsylvania Department of Labor and Industry compiles a list of high priority occupations (HPOs), identified by employers as high-demand that also require skills training and provide "family sustaining wages." On the Department's 2019 list of HPOs for the Oaksburg region, almost a third of all occupations were in production or production-related installation, maintenance, repair, transportation, and material moving. Healthcare and healthcare support occupations comprised another 10% of occupations, and a range of construction occupations were included on the list. Of all the region's HPOs, 23% require a BA or higher, while the remaining 77% require sub-baccalaureate training and/or on-the-job work experience (Pennsylvania Department of Labor and Industry, 2019).

Employers in Pennsylvania report that the primary reason for high worker demand across these industries, especially in manufacturing, is a lack of applicants with appropriate skill qualifications (Susquehanna Polling and Research, 2018, 2019). The lack of workers with middle-skill qualifications, combined with projections for the skills gap to increase over the next decade, prompted the Pennsylvania Department of Education and Department of Labor and Industry to enact a variety of legislative changes to support career development.

**Pennsylvania CTE Policy Context**

Efforts by schools in the Oaksburg region to modernize and support CTE were a direct response to this career development legislation. In 2018, Pennsylvania replaced its school evaluation system with the "Future Ready PA Index." This new evaluation system reduces the weight of test scores from 85% of a school's accountability score to 33%, the minimum required federally by the ESSA,[2] and it creates college and career measures that account for another 33% of the score. The college and career measures are based, in part, on new career education and work (CEW) standards, which require students from grade 3 to demonstrate career-readiness knowledge and skills. The CEW standards are implemented under a revised Act 339, which requires schools to connect counseling programs to districts' regional Career and Technology Centers (CTCs) and community representatives.

The state has also made changes to students' graduation requirements. Previously, to graduate, all students were required to pass Keystone exams in algebra I, literature, and biology. In 2017, the passage of Act 6 addressed the graduation requirements of "CTE concentrators," or those students who have completed at least half of a state-approved CTE program of study. Under Act 6, CTE concentrators can waive the state Keystone graduation exams requirement if they instead meet locally-established grade-level requirements in the areas tested by the Keystone exams (i.e., they pass classes in algebra, literature, and biology) and pass a state-approved, industry-based, competency assessment or "demonstrate a high likelihood of doing so," based on their grades and other indicators of performance. These competency assessments

[2] The federal passage of the "Every Student Succeeds Act" (ESSA) in 2015, which replaced "No Child Left Behind" (NCLB) legislation, provided flexibility for states to set their own standards for student achievement. This allowed states to de-emphasize standardized testing in school performance measures and incorporate a number of career readiness indicators.

include exams such as those of the National Institute for Metalworking Skills (NIMS) and the National Occupational Competency Testing Institute. The following year, Act 158 of 2018 increased the flexibility of graduation requirements for all students. Instead of passing state Keystone graduation exams, students can now demonstrate proficiency in a number of ways, provided they also complete grade-based requirements in the academic content areas tested by the Keystones. These alternatives include attaining an established score on a replacement test (such as the SAT, an advanced placement [AP] test, or the international baccalaureate exam) or another approved alternative assessment in the content areas associated with the Keystones; completing a pre-apprenticeship program (a program partnered with a registered apprenticeship that prepares high school students to enter an apprenticeship upon graduation); or being accepted into a four-year college. Students can also demonstrate proficiency by meeting locally-established grade-level requirements in the areas tested by the Keystone exams and attaining three of the following: an established score on an alternative exam in a content area associated with their career plans; acceptance to a sub-baccalaureate postsecondary institution; an industry-recognized credential; completion of a postsecondary course through dual enrollment; completion of a service learning project; full-time employment; or completion of an internship, externship, or cooperative education program.

Pennsylvania has supported its increased emphasis on career education with increased funding. Between 2018 and 2019, Governor Tom Wolf's PA Smart Initiative distributed $70 million in grants for science, technology, engineering, and mathematics (STEM) education, apprenticeships, and school-industry partnerships. In 2019, the passage of Act 76 created a grant program for pre-apprenticeships, established a centralized online database of articulation agreements between high schools and all state-related postsecondary institutions, and set a

requirement for all CTE programs to have a local occupational advisory committee. Using federal funding available through the Workforce Innovation and Opportunities Act, the state Department of Labor and Industry also created a "Teacher in the Workplace" (TIW) grant program. With TIW grants, local workforce development boards can create programs for educators to interact directly with local businesses to enhance their instruction with knowledge of industry needs and opportunities. This program invites teachers to spend a (compensated) week during the summer at local businesses. The idea is that teachers will share with colleagues what they learn from these businesses to further align the education and workforce development.

The state also directly increased funding for CTE, recognizing that the high costs associated with its equipment-intensiveness. While federal funding supports CTE through Perkins V legislation, these funds currently make up less than 5% of the Pennsylvania CTE budget. The state CTE subsidy contributes approximately an additional 8-10% of the budget, and the remaining 85% comes directly from local school districts' budgets (Cullen & King, 2020). Starting in 2018 and continuing through 2020, the state increased the annual CTE budget by $10 million per year, with additional funding for equipment grants of up to $50,000, contingent upon local matching.

Embedded in the Commonwealth's legislation and budgeting to support career development have been efforts to elevate the status of vocational learning and four-year college alternatives. For example, in its justification for changing graduation requirements to be more inclusive of career-preparation efforts, the PA Department of Education (PDE) rejected the 2006 Governor's Commission on College and Career Success's conclusion that, "the Commonwealth must prepare all students to go to college, whether they choose to attend or not, as they will need 'college level' skills and knowledge no matter what their choice" in a globalized economy

(Commission on College and Career Success, 2006). Instead, in its recommendations to the PA General Assembly, the education department stated, "PDE has concluded that current graduation requirements too narrowly define postsecondary success" (Pennsylvania Department of Education, 2016), and pushed for recognition of the more expansive picture of success represented by the graduation requirement reform. Within both pieces of legislation outlining the new graduation requirements were provisions stipulating that any remediation to help students pass Keystone graduation exams may not intrude on a student's time for CTE coursework (Act 6, 2017; Act 158, 2019), thereby placing CTE on equal footing with academic instruction. The Act 76 legislation of 2019 included a provision to officially exchange the term "vocational-technical schools" for "career and technical schools," reflecting efforts to improve the perception of CTE programming. It also requires that schools treat career presenters as equal to higher education presenters in terms of opportunities to recruit and share information about postsecondary options.

## Regional Education Context

Given the state's substantial changes to school evaluations, as well as graduation and other career education requirements, school districts in Oaksburg have made a number of efforts to meet – and in some cases exceed – these requirements. As I will show in Chapter 3, school leaders' efforts have been influenced not only by local industry needs, but also by the perceived needs of the student populations they serve. The remainder of this chapter details characteristics of Oaksburg schools and student bodies, as well as the specific career education programs and support that the schools have begun offering.

### *School Districts*

Within the two counties that constitute the Oaksburg region are a total of 23 independent public school districts. The districts each have one comprehensive high school, with the

exception of the largest district, which has two. The student populations in each district range in size from approximately 950 to 8,000 students, with most districts housing somewhere between 3,000 and 4,000. According to classifications used by the National Center for Education Statistics, two of the districts in the region are considered to be located in small cities (the county seat and another town in the region). The remaining 20 districts are split evenly between suburban and rural areas (National Center for Education Statistics, 2019a). While the proportion of non-Hispanic white students in each district ranges from 9% (in the most urban district) to 93% (in a rural district), most districts in the region have a student body that is around 85% non-Hispanic white, reflecting the large white population of the region more broadly. Also reflecting regional population trends, the free/reduced-price lunch (FRPL) population in most districts is smaller than the national average of just over 50%. In a typical district in the region, somewhere between 30% and 40% of students are in the FRPL program, although this proportion ranges from 10% to 100% across all of the districts. Although the district with the largest FRPL population is also the region's most urban and most non-white district, the remaining districts with above-average FRPL populations are a mix of urban and rural districts.

Within the region, there are three CTCs dedicated exclusively to students in CTE. Two of the three are part-time programs housed within comprehensive high schools. The full-time CTC operates as an independent school that students from neighboring high schools can apply to transfer into full-time, with acceptance a competitive process based on middle school performance and teacher recommendation. However, this CTC is a substantial distance from some parts of the region, requiring students furthest away to ride a bus for over an hour each way. In these schools, educators report that most students in the district zone do not give real consideration to the CTC, instead taking the CTE courses offered by the local high school. Of the

two CTCs housed within comprehensive high schools, one is open only to students within the comprehensive high school of which it is a part. The other is open to students from surrounding districts as well as the comprehensive high school it belongs to, but it offers only five programs in total.

### *Career Education*

All of the schools in the Oaksburg region are implementing the state CEW standards and tracking their associated student outcomes with career portfolios that students continually develop, starting in grade 3. Like most districts across the United States (Gray & Lewis, 2018), each district offers a variety of work-based learning activities, such as internships, shadowing, and cooperative education. Additionally, most of the comprehensive high schools offer in-house CTE, with vocational classes that students can take without attending their district's designated CTC. Districts' CTE coursework ranges from a smattering of elective courses in the trades (shop classes), business, culinary arts, information technology, and agriculture, to highly developed state-approved CTE programs of study.

For a CTE program to receive state approval, it must meet an extensive set of criteria. Approved programs must 1) address industry needs as determined by a local occupational advisory committee of industry representatives, 2) offer a progressive sequence of courses that provide the opportunity to sit for an industry-recognized occupational credential, 3) evaluate students with a state-approved competency assessment, 4) align with a postsecondary CTE program such as a community-college major or apprenticeship, and 5) be linked to a CTE student organization (such as Future Farmers of America or Future Business Leaders of America). Similar to the system in which AP courses count as college credits, many of the state-approved CTE programs also provide students with credits at a local community college. A minority of the

districts in the region offer a small number of state-approved CTE programs (between 1 and 5). However, given the stringent requirements for state approval, most of the districts offer CTE opportunities that meet some but not all of the requirements. In recent years, a subset of these program elements has become especially common, even in districts with no state-approved CTE program. These include local occupational advisory committees that advise schools on industry needs and program curricula, opportunities for students to earn industry-recognized occupational credentials, and articulation agreements with community colleges and apprenticeship programs. Traditionally these agreements have allowed high school students to earn community college credits at a reduced rate in academic subjects such as literature and math. However, schools are increasingly offering articulation agreements in technical subjects such as carpentry, automotive technology, and information technology. Additionally, one community college in the Oaksburg region offers internship training programs, taught by certified industry members, for high school students. These programs result in industry-recognized certifications for positions such as automotive technician and nurse aid.

The strong relationships between public schools and local industry in the Oaksburg region are based on decades of local business community engagement. Most businesses across the region are small- to mid-size, family-owned companies, many of which regularly cooperate with each other to capture economies of scale. In the 1990s, amidst new federal funding opportunities through the School-to-Work Opportunities Act of 1994, a number of these businesses began extending their relationship networks to include schools. One outcome of these relationships was the development of the "County School-to-Industry Partnership" (CSIP)[3], which serves as a nonprofit intermediary between schools and local industry. Sponsored

[3] "County School-to-Industry Partnership" is a pseudonymous name.

primarily by grants, annual fees paid by member schools across the region, and donations from local businesses and institutions of higher education, CSIP has offered career development opportunities for educators and students since its founding. These include dozens of career exploration programs hosted by local businesses to explore careers in all of the 16 National Career Clusters outlined by the National Association of State Directors of CTE Consortium, educator workshops on implementing the CEW state standards, small grants for teacher career development projects, and various educator networking opportunities.

Most recently, CSIP has helped to coordinate pre-apprenticeship programs for high school students interested manufacturing, construction, and electrical wiring. Each program is developed and administered by instructors at a registered apprenticeship program run by a local company, union, or trade association. Like apprenticeships, the pre-apprenticeships offer a combination of theory and hands-on training. Students receive a high school credit for their participation, as well as preferential access to apprenticeship programs upon graduation.

Some of the region's chambers of commerce have begun to take on a role similar to that of CSIP, helping to coordinate local internships, shadowing opportunities, and pre-apprenticeship programs for students in their local high schools. One of the chambers drew on pre-existing relationships between four manufacturers and three local school districts to develop manufacturing pre-apprenticeship and apprenticeship programs. Approved by the PA Department of Labor and Industry in 2017, the pre-apprenticeship program received state grants to support initial program development. Students in the program complete a virtual manufacturing curriculum in their high schools, then spend several hours per day progressing through a series of hands-on rotations at participating manufacturers. With the hope that the pre-apprenticeship will provide a pipeline of reliable employees, the participating manufacturers

played a large role in the development of the curriculum and training benchmarks. The chamber expects that the businesses, now seven in number, will eventually fund the program entirely. The ultimate goal is to build a "supply chain" of local talent.

These close school-industry relationships place Oaksburg's schools in the minority nationally. Only about a third of school districts across the United States have business advisory councils, employer advising on in-demand occupations, employer guidance on CTE equipment, or employer participation in school events (Gray & Lewis, 2018), all of which are central to the CTE programs in most of the districts in Oaksburg. These relationships have been further bolstered in some districts by participation in the recent TIW program.

Districts recognize that participating in new career education opportunities, especially those that culminate in industry credentials or postsecondary credits, places considerable demand on students' time. To enable students to take advantage of these programs, many districts have increased flexible scheduling. In these districts, students can meet their course requirements by the end of their sophomore or junior years by completing online coursework, independent study, and summer classes. This flexibility allows ample time for students to participate in internships, pre-apprenticeships, and elective coursework in and outside of their school buildings.

### *Focal School: "Oaksburg High School"*

Of all the schools within the Oaksburg region, OHS has made some of the boldest efforts to revamp its CTE programs. It served not only as a site for observations and school-leader interviews, but also as the setting for a survey I administered on the relationship between CTE participation and student vocational development. Chapter 5 will detail this survey's findings and implications for CTE program access and design.

Demographically, OHS is typical of high schools across the Oaksburg region. The only high school in its district, OHS is a mid-size school in a rural part of the region. Its student population is majority non-Hispanic white, and Latino students make up the largest ethnic-minority subgroup, at 15% of the student population. Almost half of OHS students participate in the FRPL program.

As shown in Table 4, the school had a 90% four-year graduation rate in the 2018-19 school year. In addition to offering AP coursework, OHS offers "College in the High School" (CHS) courses that have articulation agreements with a local community college. OHS offers a total of 16 AP and CHS courses, and over a third of the students have participated in them. Of the students graduating in 2019, 57% entered postsecondary education, 38% entered the workforce directly, and 12% entered the military (Pennsylvania Department of Education, 2020).

Table 4: 2018-19 Oaksburg High School Student Graduation Rate, Advanced Coursework, and Postsecondary Trajectories

| | **All Students** | **Economically Disadvantaged Students** | **White Students** | **Latino Students** |
|---|---|---|---|---|
| **Four-year graduation rate** | 90% | 85% | 89% | 95% |
| **Advanced coursework** | 36% | <20% | -- | -- |
| **Postsecondary trajectory** | | | | |
| Postsecondary education | 57% | 50% | 56% | 65% |
| Workforce | 38% | -- | -- | -- |
| Military | 12% | 9% | 9% | 25% |

Over the past several years, OHS has made monumental efforts to revamp its career education and vocational course offerings. These efforts have contributed to a broader district vision

centered on cultivating skills for a global economy and expanding students' access to up-to-date technology. Its most ambitious career education developments began in 2017. As district leaders worked to provide relevant training on industry technologies, it became increasingly apparent that the small number of CTE programs offered at the nearest CTC were too limited. The center offered no programs in manufacturing, despite the community's heavy reliance on small- to mid-size manufacturing companies. In response, the district made the decision to update and expand their high school's own career education facilities. They took out a multi-million-dollar bond to pay for building renovations and garnered donations from local businesses to pay for equipment. Within two years, the high school had completely renovated its out-of-date vocational classrooms, transforming the under-utilized shop wing of the school into a polished career center. With the business donations, they replaced obsolete equipment with $2.5 million in cutting-edge industry technologies.

The new CTE wing of the school now includes space for training in nine skilled trades, including welding, construction, mechatronics, and robotics. At hands-on learning stations, students program CNC (computer numerical control) machines; practice different types of welding processes; wire electrical systems; troubleshoot hydraulic systems; calibrate pneumatic instruments; operate PLCs (programmable logic controllers); repair HVAC (heating, ventilation, and air conditioning) systems; and drive forklifts and backhoes, among other activities. Additional classroom space is dedicated to a graphic arts lab with industrial printers, computer labs where students learn CAD (computer-aided drafting) software, and a learning center outfitted with 4D augmented-reality computers. Throughout the building, 3D printers are used for rapid prototyping of models in manufacturing, construction, and the arts.

The names of local businesses are proudly displayed on the walls of the career center. According to public statements by district leaders, the purpose is to honor their financial contributions and in-kind donations to the school, as well as to highlight their central role in the past and future of the community. Indeed, collaboration with local industry was integral to OHS's career education vision from its inception. As they developed blueprints for the new career center, district administrators met with over 40 business leaders to recruit not only donations, but also participation in their forthcoming internship programs, career shadowing days, career fairs, and other career education activities. From their relationships with these business leaders, the district put together a business advisory board, comprised primarily of manufacturers, to gather recommendations for further program development.

OHS offers coursework sequences for a variety of career pathways, including agriculture and natural resources; architecture and construction; arts, A/V, and communication; business and finance; hospitality and tourism; human services; information technology; and manufacturing. By far, most of the courses currently offered are in the architecture and construction and manufacturing pathways, and the school has already met a number of the state's requirements for CTE program approval for these pathways. In addition to forming an occupational advisory committee, OHS offers students the opportunity to earn a number of industry-recognized occupational credentials and licenses, including certification by the NIMS and the American Welding Society and certificates in electronics and forklift certification. The district also offers CHS courses in the welding program for community-college credit. With the career-pathway elements it has in place, the school is in the process of applying for state approval of its CTE Programs of Study in architecture and construction and manufacturing. In the meantime,

representatives from the state Department of Education have visited the OHS career center and congratulated the school on its extensive efforts to support CTE.

While the center's emphasis on manufacturing reflects the most pressing workforce development needs of local industry, district leaders hope to continue expanding their CTE coursework offerings. Looking ahead, they plan to create opportunities for students to earn certifications in healthcare, reflecting the community's second-largest industry. In a further response to local business leaders' concerns, OHS is planning to certify students' development of "soft skills" – communication skills, work ethic, time management, and other behaviors that demonstrate professionalism. By conferring a district-sponsored credential on students who have demonstrated these behaviors, OHS aims to improve the job-market readiness of students in all fields of study, while providing industry leaders with assurance that their students will make reliable new hires.

**Conclusion**

Career education at OHS and other schools across the region has been highly responsive to and supported by local industry. The strongest involvement has been from the manufacturing industry, the economic bedrock of the community, which is currently facing projections of serious worker shortages in the coming years. Given the unique profile of the industry considerations that inform Oaksburg CTE, the findings from this region do not reflect what CTE looks like or how it shapes student outcomes in other areas. However, Oaksburg does illustrate how the process of local CTE implementation and adaptation becomes interlaced with particular economic and legislative fluctuations. In turn, the design of CTE programs may vary considerably from the model programs on which CTE policy is based. The case of Oaksburg reveals how and why such variations may occur, as I will show in the next chapter.

# CHAPTER 3: EDUCATIONAL STAKEHOLDER PERSPECTIVES ON PREPARING STUDENTS FOR SUB-BACCALAUREATE CAREER PATHWAYS

As imagined by policymakers, CTE combines broad technical learning with high academic rigor and an increased emphasis on readiness for postsecondary education. Central to this model is the view that students in CTE should be academically prepared to pursue any level of higher education, whether they wish to attain a sub-baccalaureate certificate, associate degree, BA, or advanced degree. However, those in charge of enacting CTE may have very different conceptions of CTE's purpose. Through interviews and observations with comprehensive high school leaders and their partners in industry and workforce development, I found that many of those implementing CTE programs felt that a primary goal was to help students pursue careers that did not require a four-year degree. In this chapter, I interrogate these findings to understand how and why these educational stakeholders made sense of CTE's goals in ways that differed so sharply from those set out in policy.

While the technical-rational perspective that dominated early studies of education reform assumes that administering new reforms in schools is a matter of replicating policy with fidelity to the model and aims set forth by policymakers, implementation researchers have since studied reform as a process of adaptation (Century & Cassata, 2016; Datnow et al., 2002). The cognitive approach to reform implementation (Coburn, 2001; Spillane et al., 2002) holds that the beliefs and structured interactions of principals, teachers, and other school-based actors shape collective understandings of reform and its enactment at the school level. I draw on sensemaking theory (Coburn, 2001) to analyze how school leaders in Oaksburg understood CTE's goals in relation to the problems related to CFA that they aimed to solve.

The findings in this chapter are based on interviews and observations with 52 principals, assistant principals, superintendents, counselors, and school partners in industry and workforce development, as they developed and implemented CTE coursework, garnered resources for updated CTE facilities, and promoted school cultures in which traditional vocational CTE was considered high-status. My data show that these education stakeholders framed CTE as a solution to both a local skills gap and the perceived shortcomings of the CFA movement. They embraced state policy messaging about CTE and sub-baccalaureate education as providing financially low-risk pathways to sustainable and rewarding careers. Partners in local industry and workforce development agencies reinforced these interpretations. They emphasized industry need for a pipeline of students prepared to enter local middle-skill occupations, especially in manufacturing, construction, and other traditional vocational fields that were projecting worker shortages.

These findings highlight the ways collective ideals about comprehensive high school CTE and in turn, implementation practices in schools, are shaped by processes of contextualized sensemaking among school leaders and other education stakeholders. I argue that an opportunity structure characterized by untenable student debt levels, high college dropout rates, inflation of competitive degrees, and strong demand for middle-skill workers left education stakeholders skeptical toward conceptions of equal opportunity premised on leaving open doors to the highest levels of education. They felt that this primarily benefited those who were already most equipped with the cultural and financial resources to navigate higher-education institutions. Instead, they asserted a framework of equal opportunity as ensuring all students had access to low-cost training for careers with sustainable wages and opportunities for advancement. These findings in turn lay the foundation for understanding why educators who were advising students on

postsecondary planning worked to raise the status of sub-baccalaureate careers and the CTE fields that lead to them, which will be discussed in Chapter 4.

**Sensemaking About CTE**

The emphasis in Perkins V federal legislation as well as state-level legislation on integrating academic and career learning is designed to avoid the tracking that characterized 20th century versions of vocational education. However, CTE programming and its impacts on student postsecondary preparation depend on more than policy design. Schools as organizations – through the work of principals, counselors, teachers, and other actors – construct interpretive frameworks about a reform's meaning and purpose in ways that can be consistent or inconsistent with broader policy goals. These interpretive frameworks reflect local, contextualized, and collective understandings of a reform's goals, mechanisms of change, and intended outcomes (Coburn, 2001, 2006; Fullan, 2000; Spillane et al., 2002). The sensemaking perspective (Coburn, 2001; Spillane et al., 2002) holds that the pre-existing beliefs and worldviews of these individual actors in school contexts set the foundation for their interpretations and actions. Sensemaking theory also recognizes that individuals' interpretations are developed through their interactions with colleagues, which are often structured by professional organizations, as well as through participation in broader cultural belief systems and social structures (Coburn, 2006; Coburn & Talbert, 2006). These "shared understandings" (Coburn, 2001, p. 147) lay the foundation for the beliefs, routines, and organizational cultures through which school reforms take shape.

School leaders have a particularly important role in framing interpretations of reform policies. Principals and other school leaders bring their own pre-existing worldviews into decisions about how to approach policy implementation (Coburn, 2006). As actors in positions of authority, their sensemaking processes shape how they filter policy messaging from state,

district, and other sources to colleagues in their schools, deciding which aspects of policy to emphasize and which to de-emphasize as they allocate resources and put forth interpretive frameworks about policy goals (Coburn, 2005). School leaders who are able to mobilize resources in support of their interpretive frameworks are especially successful at institutionalizing specific approaches to education reforms (Anagnostopoulos & Rutledge, 2007). Drawing on frame analysis, Coburn (2006) shows that an important aspect of school leader sensemaking is how they define problems and their causes and propose solutions to them.

Schools in rural communities, reflecting the needs of local industry, are more likely to incorporate traditional vocational coursework into their CTE offerings (Sutton, 2017). Local business advisory boards and other school partners in workforce development make up an important part of the context in which school leaders interpret CTE's goals. These industry partners could provide both interpretive frameworks and resources for school leaders to justify learning opportunities that may not derive their status from college relevance. Analyzing these stakeholders' sensemaking can shed light on how and why school leaders mobilize resources for CTE, develop coursework, and advise students in ways that reproduce and/or mitigate stratification in learning opportunities.

## Methods

### *Sample and Recruitment*

The study sample comprised 24 school leaders from 15 districts in the Oaksburg region, along with 28 local education stakeholders in industry and workforce development. I invited school leaders – including superintendents, principals, assistant principals, and/or school counselors – at each of the 25 districts within the region to participate in semi-structured interviews and ethnographic observations, and 24 school leaders from 15 of the districts agreed

to participate. The populations in each district ranged in size from approximately 950 to 8,000 students, with most housing somewhere between 3,000 and 4,000 students. The proportion of students in the FRPL program ranged from 10% to 60% across participating districts, although the typical district's FRPL population was between a third and half of the student body. In all schools, the vast majority (at least 80%) of students were white.

With the help of school leaders, I used snowball sampling to recruit other educational stakeholders who had worked to develop postsecondary exploration experiences for youth. The snowball sampling technique aligned with the goal of the study to understand how education stakeholders dynamically constructed interpretations of career education and postsecondary readiness within their pre-existing networks (Noy, 2008). These stakeholders included employers in manufacturing and construction, along with apprenticeship instructors, leaders of postsecondary readiness organizations, and members of workforce development organizations (n = 28). All these educational stakeholders directly partnered with high schools to facilitate career- or college-related explorations and development. Recruitment of educational stakeholders continued until I reached a theoretical saturation point (Glaser & Strauss, 1967; Patton, 2002), resulting in a total of 52 interviews with educational stakeholders, including school leaders. Together, the interview participants constituted not a representative sample of educators and educational stakeholders across the region, but rather a "panel of knowledgeable informants" (Weiss, 1995, p. 17) about local efforts to promote postsecondary readiness efforts.

Following the stakeholder interviews, I asked participants (with the exception of state government representatives) if they would be willing to have me observe meetings or events at which CTE and other postsecondary readiness programming would be implemented, planned, discussed, or celebrated. I was subsequently invited to observe chamber of commerce meetings,

school counselor meetings, educator-employer partnership meetings, educator-employer partnership celebrations, student career fairs, student STEM conferences, student counseling meetings, and other career readiness events geared toward students. Administrators and CTE teachers frequently gave me tours of their schools or CTE classes and allowed me to record observations. With permission from the executive director, I also attended and observed the Pennsylvania Association of Career and Technical Administrators annual "Education and Workforce Development Symposium."

During the observations, I introduced my project to the group being observed and then began recording field notes. At times, I also participated in the meetings or activities at hand, such as volunteering at career fairs. I expanded and reflected on my field notes as soon as possible after observations. In total, I completed 114 hours of observations with educational stakeholders and students, 58 of which directly involved observing students in CTE or career-related programming.

***Interviews and Observations***

The interviews began with open-ended questions about education stakeholders' broad ideals of what success looks like in general and for their students or apprentices, with probes about the factors they considered when forming these ideals for particular youth. The questions then focused on the specific expectations and goals the participants had for young people in the realm of school, work, and future residence, with probes about potential constraints on these goals and expectations (e.g., "Do you encourage youth to attend a four-year college or a shorter version of postsecondary training?" "Do you prioritize general learning or specific skills training?" "What is the role of student debt in shaping or constraining these goals?"). I then asked whether they thought the expectations and goals they had for youth were shared by the

youth themselves and other important adults in the youths' lives, as well as the impact these expectations have on youth (e.g., "Do teachers feel that their students' parents have the same expectations that the school promotes?" "If not, how do youth navigate these competing expectations?").

I then asked about participants' perspectives of the career development programs and opportunities offered at high schools in the region. In the interviews with educators, this took the form of questions about the programs they taught or helped to design and how they felt such programs fulfilled or failed to fulfill their goals for their students. I probed participants' views on the broader role of education at both the local and national level and the role of industry partnerships in education. In interviews with employers and state government representatives, I asked about the specific career development and training programs that they offered or supported and the role they believed it played in helping youth meet employers' expectations.

I then asked about perceptions of the local community. How do educators, employers, and state government representatives and other community leaders perceive economic opportunity in the region and what are their predictions for the future? What employment prospects do they predict will be available for youth who are currently in high school once they reach the labor force? Will those prospects be just as strong in 10 or 20 years? What other features of the local community do they expect will create opportunities or impose constraints for youth? Do they expect youth to remain in the community upon graduating high school or to live elsewhere?

Finally, I asked questions about participant demographic information that did not come up organically in response to the other interview questions. Demographic information collected included education level, current employment, previous employment, the number of years they

had lived or worked in the community, and any other aspects of their identity that they felt influenced their work with youth. (See Appendix B for a full interview schedule.)

The interviews took place at locations of the participants' choosing – personal offices, conference venues, coffee shops, or the participant's home. Each interview lasted between 60 and 120 minutes and was audio-recorded and transcribed with permission. As a token of gratitude, participants were provided a $10 gift card at the start of the interview. No identifying information about the participants is reported in this study.

Participants also allowed me to observe administrator meetings, chamber of commerce meetings, educator-employer partnership meetings and celebrations, student career fairs, counseling meetings, and other career readiness meetings and events. Owing to the decentralized nature of public education throughout the region – with 25 small public-school districts operating independently with their own course offerings, career-preparation opportunities, and industry partnerships – the administrators and counselors have a number of formal and informal networks for ongoing communication and resource sharing. As districts throughout the region worked to expand their CTE course offerings and relationships with local industries, these networks served as key sites of meaning-making for redefining the roles of schools to support students' transitions to postsecondary opportunities as well as the relationship between schooling and the broader economic and community context. By observing these network events, rather than simply asking about them during interviews, I was able to see how meanings of student success were constructed through interactions with others, the potentially unstated or tacit assumptions on which these meanings are based, and the reasoning behind various actions taken to support students and/or meet other goals of CTE promotion (such as increasing the pipeline of middle-skill talent for local industry; DeWalt & DeWalt, 2002; Emerson et al., 2011).

I also observed CTE classes, career fairs, counselor meetings with students, pre-apprenticeship training sessions, apprenticeship training sessions, college-preparation programs, and other student-oriented postsecondary preparation events. At times, I participated in these events by helping with career-preparation activities. Observing classes and other student events allowed me to witness first-hand the ways in which educators communicated their constructions of postsecondary success to students, worked to dispel what they viewed as outdated notions of success (e.g., pursuing only careers that require a four-year college degree), and created learning experiences to guide students through what they deemed to be appropriate vocational development. I was also able to witness how students in turn made sense of these experiences. They frequently asked questions about how the information being communicated related to their own career development trajectories and shared their hopes and frustrations with educators and with each other.

### *Analysis: Thematic Coding and Inter-coder Reliability*

The interview and focus group data were analyzed qualitatively by thematic analysis using both theory- and data-driven approaches to identifying and interpreting patterns (Boyatzis, 1998). I followed the codebook structure outlined by MacQueen, McLellan, Kay, and Milstein (1998). For each code, the codebook contained a definition, any relevant inclusion criteria, relevant exclusion criteria, and an example from a transcript. If applicable, I also included the interview question stem that tended to prompt the theme being coded. Codes and their definitions reflected the research questions and were based on the education literature on postsecondary preparation as well as the sociological literatures on occupational prestige, cultural modes of status attainment, and social reproduction/social mobility in education. For example, major categories of theory-driven codes included the following: ideals of success; role of education in

the community; opinions on college for all; expectations for students; goals of career and technical education; student opportunities and constraints (academic, financial, information, other). The codes within these categories were designed to capture how participants made sense of CTE's goals and determined which pathways were realistic and worthy of pursuit by students, given the academic, financial, and other constraints they faced (Dougherty, 2018b; Gottfried & Plasman, 2018; Rosenbaum et al., 2015).

I first coded several educational stakeholder interview transcripts in accordance with the codebook, although I revised code names, definitions, inclusion criteria, and exclusion criteria as necessary in order for codes to better reflect the words and categories used by the participants. In this way, the codes reflected both etic and emic conceptual categories and themes.

I then employed two graduate student research assistants to collaborate on coding each set of qualitative data in an effort to improve the validity and reliability of the coding process. Although coding is an interpretive act on the part of the coder, both validity and reliability are central concerns insofar as the codes reflect the realities of participants' lived experiences. Disagreement between coders about the applicability of certain codes to subsets of text signals issues with the validity of the code definitions or the accuracy with which they capture the theme at hand, which can result in inaccurate portraits of themes in the data. Although my interpretation of the thematic patterns emerging from the qualitative data in this study is inherently subjective, reflecting the theoretical frameworks I use to make sense of thematic patterns as well as my personal subject positioning and biases, the existence of particular themes themselves within the data is a matter subject to agreement or disagreement between coders, with the degree of agreement able to be ascertained through inter-rater reliability scores (Armstrong et al., 1997).

After discussing the codebook and coding process with the research assistants, I asked

them to re-code some of the education stakeholder transcripts I had already coded. Following Campbell, Quincy, Osserman, and Pedersen (2013), I predefined blocks of text by removing the codes – but not the brackets indicating a unit of coded text – from the transcripts I had already completed coding. This meant that the research assistants' efforts were spent applying the codes, rather than determining units of analysis, reflecting the goal of improving the reliability of the coding scheme rather than coming to an agreement on the appropriate process of text unitization.

I then met with the research assistants to review their coded transcripts and discuss points of disagreement between our applications of the codes. Together, we determined whether disagreements about the application of certain codes to particular units of text were due to coder error (misunderstanding the coding scheme), issues with the specificity of the code, or the need for a new code (for example, if the existing codes did not match the mental categories or language used by the participants; MacQueen et al., 1998). After revising the codes to reflect these conversations and coming to agreement about the first transcript, I adjusted my codes on the transcripts I had already coded and assigned an additional transcript to the research assistants. We repeated the process of meeting to review points of disagreement, revising the codebook, and recoding, until we reached a Cohen's Kappa score of 0.45 (indicating fair to good agreement) for six consecutive transcripts (11%) of the educator stakeholder interviews.[1]

This process of revising codes to better fit the data introduced some inductively derived codes into the codebooks, which we extended throughout the coding process by intentionally analyzing the data for themes that were not captured by the theory-driven codes (Strauss & Corbin, 1990). Because one goal of this project was to rethink assumptions about educator

[1] We measured Cohen's Kappa using NVivo's coding comparison query tool, which accounts for coding agreement that could have occurred due to chance when calculating reliability scores.

beliefs, this inductive approach to data analysis was an important step in uncovering factors potentially unrecognized by prior researchers that influence beliefs. As we coded, the research assistants and I independently reread each transcript and made lists of themes that we noticed that had not already been assigned a code. I asked the research assistants to pay particular attention to uncoded text and to make notes of potential codes using the participants' own words and phrases as much as possible. We then met to share our lists, discuss commonalities and discrepancies, and construct additional codes that reflected experiences and ideas not captured by the previous codebooks. The research assistants then went back to the previously coded transcripts to apply the new codes, and I monitored to ensure that the Cohen's Kappa between the two research assistants was consistently above 0.45. I also reviewed each of the resulting coded transcripts. In the rare event that I had concerns about the coded data, I met with the research assistants to discuss these concerns, adjust the codes if necessary, and develop a plan for adjusting the already-coded transcripts with the adjusted codes in mind.

I then sorted the codes across educators, employers, and members of workforce development organizations, with attention to patterns of declaration, frequency, omission, and corroboration across participants (LeCompte & Schensul, 2010). I narrowed the code patterns to central themes relevant to the research questions, including perspectives that CFA commitments had a harmful impact on many students, optimism that sub-baccalaureate career preparation could provide students with promising career options, and dedication to raising the status of CTE. I interpreted these themes through the lens of sensemaking theory, with special attention to how local context shaped the ways school leaders and other educational stakeholders understood the goals of CTE.

## Findings

### *Rejecting College for All*

All the school leaders and school partners in industry and workforce development felt strongly felt that schools' previous commitments to preparing all students to enter a four-year college had been misguided. Whereas some of the schools in the region had boasted in the 2000s and early 2010s about their students' four-year college enrollment rates, school leaders at the time of the interview were averse to using this statistic as a marker of excellence. The educators explained to me the frustrations that, in hindsight, they felt had led to their collective rejection of the CFA mentality. As one school director put it:

> If you'd have done this [study] several years ago, we'd still be in the college for all mode. "Let's ship them all to college." But I don't know what happened to turn the tide. I don't know if it's all the college loans or all the college-educated kids who are baristas or whatever it is, but we finally woke up … So, I was working when we tore all the shops out of the schools in the '90s, early '90s. Now we're trying to put them all back. Everybody seemed to have woken up, and there's a shortage of workers.

In this observation, the director succinctly summarized three major factors in "waking up" to CFA's shortcomings that every interview touched on at some point: rising college debt loads, increasing degree inflation, and a growing skills gap in middle-skill careers. Too many young people with college degrees, they explained, were overeducated and underemployed, working as baristas and fast food managers. They compared the current value of a BA to the weight it carried on the job market in the past. A counselor who graduated from college in the 1980s explained, "…especially my generation and the previous generation, a lot of times if you did have a four-year degree, that was a ticket to success. But that is not playing out today." The participants referenced all the people they knew who felt trapped by student debt, and they commented on the millennial generation's struggle to achieve traditional adult milestones such as

owning a home. At the same time, they explained, young adults were missing out on skyrocketing local demand for middle-skill careers that didn't require BAs but did require specialized technical training that general high school and college curricula generally lacked.

Participants' concerns about the value of a four-year college degree reflected the growing visibility of declining earnings for BAs (Ashworth & Ransom, 2019), increases in underemployment for BA holders (Gould et al., 2019), and, above all, the extremely high tuition and debt levels across the state of Pennsylvania (Gonzalez et al., 2019). This debt leads to relatively low short-term returns on investment at the public four-year colleges that Oaksburg students are most likely to attend, according to estimates from the Georgetown Center on Education and the Workforce. Students' median return on investment 10 years after graduation at these schools is estimated to be lower than that of four-year colleges nationally (approximately $66,000 compared to $71,000). After a lifetime of working, these graduates are expected to catch up to typical college graduates nationally. Their estimated 40-year return on investment ($914,000) actually exceeds the national four-year median of $864,000 (Carnevale, Cheah, et al., 2019); but in their early years of adulthood, at a time when many expect to achieve milestones such as home ownership and family formation (Silva, 2012), Oaksburg students who attend college are likely to be paying off high debt loads. Combining these trends with the concerns about the declining value of BAs, which already have lower earnings premiums in rural areas (Economic Research Service, 2020), it is easy to understand why the educators felt that the local four-year degrees were no longer the "ticket to success" that they once had been.

A more pressing concern among most of the educators – and for many of them, the most damning indictment of the CFA doctrine – was their increasing awareness of college dropout rates. National statistics on four-year college persistence had become part of the parlance among

networks of counselors and administrators across the region, and some districts had recently adopted new tracking systems that allowed them to monitor the college persistence of their own graduates using National Student Clearinghouse data. At the public four-year colleges frequently attended by Oaksburg students, dropout rates ranged from 15% to 49%, with a median dropout rate of around 45% (Carnevale, Cheah, et al., 2019). These schools as a group performed slightly worse than typical four-year colleges nationally, which have a median dropout rate of 40% (National Center for Education Statistics, 2019b). Even if students are willing to accept heavy debt loads in early adulthood in exchange for payoffs later in life, taking on loans to attend college is a real gamble for typical Oaksburg students, almost half of whom will receive no payoff at all.

The schools' years of effort to improve students' college enrollment rates, only to find that many of their former students left higher education with little to show except debt and discouragement, generated a sense of obligation among educators to provide students with better alternatives, now that they knew better. One assistant principal shared the following story with students and families as his own personal moment of reckoning:

> My little brother dropped out of college after a year and a half. His heart wasn't in it. Initially I was asking my parents like, "What the heck went wrong?" My dad turned to me, and this is a memorable experience for me – I share this with kids a lot – my dad said, "This is your fault. In our school system, you tell kids that this is what they need to do when they leave high school, and that's not what [he] needed. He needed to have hands-on work that kept him busy."

In turn, the administrators and counselors made it a point to redirect a subset of students who would otherwise likely enroll in four-year schools into sub-baccalaureate educational options. Exceptions arose at two of the four CTCs, where only a minority of students planned to attend a four-year college in the first place. Even in those two cases, administrators described shifting their messaging about the types of degrees that students should aspire to, backtracking

on their push in the late 1990s and early 2000s to encourage more four-year college enrollment. A minority of rural districts went so far as to set reduced four-year college enrollment as a goal. "We want fewer kids going to college," stated one superintendent, as he explained that reducing their students' enrollment in any postsecondary institution from just over 60% down to 50% would signal that more students were being intentional and realistic about their career pathways. A principal from the same district explained,

> …before, we were pushing kids into four-year schools that shouldn't go to four-year schools and, quite frankly, probably didn't want to go to four-year schools. So, by sending fewer kids there … it's not depriving kids of opportunity. We're just steering them in a direction where they will be more successful. So, it's not about shutting doors, but it's about opening the right ones.

In this principal's view, reducing college enrollment is a way of maximizing students' opportunities. But who are the youth who "shouldn't go to four-year schools," and how do they determine which doors are "the right ones"?

Many educators maintained that if students made choices based primarily on their occupational goals, keeping in mind the cost-benefit ratio of various degrees in their chosen fields, numerous students would find pursuing a bachelor's or advanced degree to be unnecessary: "There's no reason that someone needs to go do four years of school if they only need two years to do the job they're interested in anyway." According to this point of view, the students who should not be going to four-year schools are simply those whose career goals do not require it, and the "right doors" are those that provide the training necessary for their chosen careers at the lowest price. Other educators, especially those who served large populations of low-income and working-class students, communicated that students' socioeconomic status played a role in determining who was most likely to benefit from pursuing four-year degrees and who was not:

> Generally speaking, those people that have that expectation [to go to a four-year school] have the resources to provide support to do that … if you look at the data, what we're finding is that those kids that go to college without support systems and without direction don't last. Essentially, they are the ones that drop out. On top of that is that when you dig into the numbers, when you look at … crushing student debt: student debt just doesn't go to those that graduate. What happens is that you have kids that come from economically disadvantaged families. They think they're going to go to college and things work out for them. They don't, and now they don't have any income, but they have this debt and it's a double-edged sword.

In other words, applying the expectations of success held by middle- and high-income families to low-income students fails to acknowledge their differences in resources, support systems, and "direction," or clear vision – presumably due to social-class experiences – of how their college experience will translate into career prospects. As such, according to these educators, CFA expectations ignore low income students' very different likelihood of degree completion, as well as the economic realities of debt for students with no financial safety net. In Pennsylvania, low-income students face some of the highest four-year college debt loads in the country. At public four-year colleges nationally in 2014-15, families earning less than $48,000 on average paid between about $10,000 in yearly tuition with financial aid. In Pennsylvania, families in the same earning category paid between $15,000 and $16,300 per year. For Pennsylvania families who earned less than $30,000, this tuition amounted to an average of 289% of their discretionary yearly income, meaning very low-income students have little choice but to take out substantial student loans (Cochrane & Ahlman, 2017). These same students are the least likely to graduate. Of low-income students at the public four-year colleges most commonly attended by Oaksburg students, just 50% graduate (US News and World Report, 2020),[2] leaving the remaining half in serious debt with no degree.

[2] College completion rates in these statistics are based on students who received Pell grants (federal grants for students with exceptional financial need).

With little power to support these students years after they have graduated from high school, administrators aimed to set some of them on pathways with a higher probability of economic payoff. An administrator from the district that aimed to reduce its college enrollment rate, for example, explained that their school leaders hoped more students would take up opportunities like apprenticeships and other forms of postsecondary training that would allow them to earn an income as they gained new skills. Another principal from a school at which the majority of students were economically disadvantaged argued, "our kids have been marginalized and put down," referring to overly narrow standards of success that stigmatized non-college options but failed to take into account their students' disproportionate financial risk.

This is not to say that they discouraged individual students set on careers requiring a BA from carrying out their plans. When such students had concerns about paying for college, the educators reported advising them on scholarship applications and cost comparisons, as well as ways of accumulating college credits while still in high school through articulation agreements and dual enrollment programs. They also frequently suggested that students complete their first two years of postsecondary at a community college – advice that several of the educators reported giving their own children. It was the students who did not necessarily have a plan, who enrolled in college simply because it was the default expectation for what students were supposed to do after high school, who the educators felt needed college alternatives. Above all, educators were concerned about students who knew early on that they did not want to go to college. Promoting college universally, one principal explained, would alienate their students who sought postsecondary options that they viewed as more realistic or desirable than college.

Indeed, the educators were very intentional about not imposing rigid standards for what a successful high school graduate looks like. Education is "not one-size-fits-all," almost every

administrator and counselor I spoke with affirmed. “Instead of ‘we know what’s best for you,’ it’s a more personalized approach,” another principal explained when recounting the differences between the CFA era and the current career-focused approach. They were concerned that, by making college the expectation, they could be upholding a system that had benefited themselves, regardless of its potential impacts on different groups of students. One assistant principal articulated the idea that the interests of “the system” and the interests of the student are not necessarily aligned: “The reason [our teachers] are really here isn’t necessarily for the system. It’s for the kids. So, we need to make sure that what we’re doing fits what our kids need to be successful.” He went on to argue that those who truly have the wellbeing of kids at heart are open to college alternatives:

> There’s educator parents in our district who’ve really expressed a lot of gratitude for providing alternate pathways, and they’re educators. They’re people who should be diehard “love school,” “love college,” “love those things,” but they love their kids, and they want to make sure their kids are successful.

Although the educators were against the standardized expectations that CFA represented, they were not opposed to school accountability measures. Instead, they resisted the curriculum narrowing that had gone hand-in-hand with accountability reform tied to high-stakes testing during the “No Child Left Behind” (NCLB) era and, more generally, the idea of measuring student success only by traditional academic standards. One assistant principal made an argument that I heard from others in a number of different forms:

> It shouldn’t just be a Keystone score … I think accountability’s good. I think accountability is needed … We’re starting to recognize other assessments that students can be proficient at. It doesn’t just have to be algebra or biology or literature. Even though those are important, to have a general understanding and a knowledge of that, but does that really determine if that kid is ready to move on? I would say not.

He went on to praise the state's efforts to count student proficiency on industry assessments in school accountability scores, a new flexibility accorded to states under the ESSA, which replaced NCLB legislation in 2015. District leaders applied the same logic as they expanded their own measures of postsecondary success. One counselor urged,

> Ask me, "Are we getting kids to where they should be, where they want to be? Are they passionate about where they're going?" Ask me that question. Hold me accountable. Hold me accountable. Put my paycheck to it, if you want to. That's what's important, not how many kids we send to college.

In this passionate argument against the CFA ideology, this counselor encapsulated the shared belief that an educational system based on competition for access to exclusive credentials has failed to support their students in getting "where they should be" – namely, into rewarding and sustainable jobs.

Indeed, for most school leaders, finding ways to help students access college alternatives was a matter of educational equity. A principal in the district that aimed to reduce college-going insisted that the purpose of education is to be "the great equalizer" in society. According to him and others in his district, CFA had not served this purpose. Instead, they now sought options to support their students in attaining more accessible career exploration and training.

Other goals of education – such as developing citizens who can reason ethically and critique pre-existing social arrangements or supporting individuals' realization of their intellectual and creative potential – were seldom mentioned. When I introduced these considerations, some educators argued that pursuing these lofty ideals through college was a privilege few could afford: "To study whatever you want for the sake of studying it is awesome … unless it cost you so much money that you will never, ever be able to pay it back." Furthermore, they explained, problem-solving and critical thinking were not exclusive to college-educated individuals. Plenty of other, lower-cost training avenues could cultivate these

capacities while simultaneously meeting pragmatic industry needs. These were the avenues made available through CTE.

### *CTE as an Avenue Toward Promising Careers*

The school leaders were in regular contact with employers and workforce development partners who served on districts' business advisory boards and participated in other educator networks to inform schools about the needs of local industry. These partners made it clear to the educators that local businesses, particularly in manufacturing and the trades, were "desperate," "screaming for help," and "dying for people" to fill middle-skill positions, due to a wave of Baby Boomer retirements and a shortage of workers with the skills to replace them. In turn, companies were willing to pay premium wages to new hires with technical skillsets.

At the workforce development events I observed, which many administrators and counselors attended, speakers from local school-industry intermediaries (e.g., the CSIP director, community college career services employees, trade association representatives) hammered home the promising job market for students willing to entertain four-year college alternatives. They drew on examples from people and companies they knew personally, such as the 19-year-old whose construction apprenticeship allowed him to work overtime until he had earned $80,000 in one year. A technical college career services director proclaimed that, in the prior year, their 40 graduating mechatronics students had received a combined 695 job offers, and that was just from companies recruiting directly through the college. An apprenticeship coordinator shared that one local company was offering "tool and die" apprentices $35 per hour, with 10 hours of mandatory overtime each week, translating to an annual salary of almost $90,000.

In line with the conclusions drawn by the PDE, these workforce partners and school leaders alike attributed industry skill shortages to years of schools focusing too narrowly on

preparing students for four-year colleges. The educators' thinking was particularly influenced by Kevin Fleming, an educational consultant, writer, and keynote speaker who spoke at events sponsored by PDE. After school leaders watched his viral YouTube video, "Success in the New Economy" (Fleming, 2012), at PDE events, they circulated it widely at professional development sessions, parent meetings, and student assemblies. In the video, which was released in 2012, Fleming describes a "misalignment between education and our work," following years of sending too many students to four-year colleges. He goes on to cite statistics on high college dropout rates and degree inflation, leading to an explosion of overeducated and underemployed workers. Fleming's transcript of the video shows that, in making his argument, he had drawn on many of the leading academic voices who initiated the conversations around CTE as an alternative to CFA in the 2010s.[3] In particular, he reiterates the conclusion of Gray and Herr (1995) that workforce education requirements follow a 1:2:7 ratio. Fleming states,

> For every occupation that requires a master's degree or more, two professional jobs require a university degree, and there are over half a dozen jobs requiring a 1-year certificate or 2-year degree; and each of these technicians are in very high-skilled areas that are in great demand. This ratio is a fundamental to all industries. It was the same in 1950, the same in 1990, and will be the same in 2030.

Following Gray and Herr and other prominent figures in the anti-CFA movement, Fleming goes on to point out that looking at the average returns to these varying degrees masks substantial variation in how much degree holders at each level earn, such that many sub-baccalaureate degree holders earn more than people with bachelor's or even advanced degrees.

[3] These influences included Kenneth Gray and Edwin Herr from the Penn State College of Education, authors of *Other Ways to Win: Creating Alternatives for High School Graduates*; William Symonds, Robert Schwartz, and Ronald Ferguson, the authors of the Harvard GSE report, *Pathways to Prosperity: Meeting the Challenge of Preparing Young Americans for the 21st Century*; Anthony Carnevale, director of the Georgetown University Center on Education and the Workforce.

He concludes with an assertion that employers no longer care so much about the degrees prospective workers hold as the specific skills they can demonstrate.

It would be hard to overstate just how strongly Fleming's video had resonated with the perspectives of the administrators and counselors I spoke with. One in every three school leaders I interviewed referred to his argument in explaining why they believed schools should be providing students with more exposure to sub-baccalaureate career options through CTE and other career learning opportunities. They regularly referred to the 1:2:7 ratio as a timeless axiom and lamented the overabundance of people in "gray-collar" careers, Fleming's term for careers held by people with more education than necessary. They contrasted the excess of overeducated workers with the dearth of skilled applicants in technical careers, which had created extreme demand for workers in industries "right in our backyard."

Like many of the people whom I spoke with, the director of one high school's CTE program felt that it was misleading to simply present students with the average returns to differing education levels. He lamented, "One of the worst posters I see is, 'The more you'll learn, the more you earn.' And it's put out by FAFSA … I'm like, 'No, it isn't. Try telling that to a second-year electrical apprentice who's making 40 grand.'" It was better, the director explained, to find a high-paying job that requires very little financial risk for training. He went on to tell me about one of the former students in his information technology program:

> I had a kid last year, walked out of here with four computer tech industry certifications, who's making $45,000 a year as 19-year-old. Does he need to spend the money to go [to college]? He's living at home, saving it. Working on the next level. And he's already has one promotion. He's in line to get the next. Next year, he'll be over 60 grand. A starting salary here as a teacher with a four-year degree is 50 grand.

In the trades, these high-paying sub-baccalaureate jobs are referred to as "gold collar," a term many participants used to denote the high wages that distinguish them from the low-paying unskilled jobs that many associate with the term "blue collar."

As they stressed the high potential earnings of many sub-baccalaureate credentials, participants were simultaneously forthright about the long hours and hard labor many positions in manufacturing and the trades, in particular, entailed. One counselor put it this way: "… we have to … be honest with these students. A lot of these positions that they're saying you're going to make $47,000 a year are hard work. And you have to take them onsite and show them, yes, you will be making that, but it's hard work." Another counselor pointed out the following:

> …there are … programs for HVAC where when you're done your five-year apprenticeship, you're making over $50 an hour. Now, that's a certain lifestyle where you might be on call 24/7, and so you have to be willing to accept that. But the benefit is you're making over $100,000 a year with zero debt. Are you willing to take that trade-off, or do you want a job where you think it's going to be a cushy job?

In sharing these details about the demands of many sub-baccalaureate positions, the educators aimed not to downplay the benefits of working in the trades, but rather, to reinforce the positions' respectability. Local esteem for honest physical labor, reflecting a proud imagined cultural heritage of German and Scots-Irish craftsmen, farmers, and hunters, permeated the interviews and observations. Many of the school leaders themselves, all of whom held MAs, EdDs, or PhDs, personally identified with hands-on and blue-collar labor or had spouses, parents, or other family members who worked in blue-collar positions. In turn, they felt personally compelled to defend the value of this work. One administrator shared,

> I come from a blue-collar family. I work a white-collar job, but all throughout my years of teaching, my summers were spent working in the HVAC industry. The day that propelled me into administration was a day I was assembling duct work in a garage of a new home, and it just hit me that the guys I'm working with, they

> make a good living, but many … might look down on what they do, and that bothered me, or not encourage those fields.

Indeed, when I asked school leaders to share which of their personal experiences had most greatly affected the work that they do, their personal connections to blue-collar or sub-baccalaureate labor was the most common response, communicated by 8 of the 26 educators in total. Through these experiences, they explained, they had witnessed promising career opportunities at all degree levels. The recent push toward career education provided a chance for them to defend the beliefs they had long harbored and to promote sub-baccalaureate training options to students.

Additionally, eight of the school leaders (four of whom overlapped with the group that had personal blue-collar connections) demonstrated their personal commitment to the push for sub-baccalaureate training options by mentioning, without my prompting, that they tell their own school-age children that a four-year college might not be necessary, depending on their career interests. One assistant principal made it a point to always speak of college as one option among many for his children: "Yeah, I'm an educator and I say quite frequently when I talk to people, 'if my kids go to college,' because they might not." A counselor explained why she proudly announced on Facebook her son's plan to go into plumbing directly after high school:

> So, I wanted people to know that we're okay with whatever, you know. Here I am, saying, 'consider all options,' in my job and I have to live by that as well, my own family. And it helps me along in my job too because I firmly believe that you've got, we need people who are going to be doing these jobs that don't require a college degree, you know? So, um, I think it is truly a mentality that has been out there about having to go to college, but it's not one that I always adhered to … And I, I've seen too many people that go and then they are not successful. But yet, they're saddled with this debt and there was no way, I mean, I wanted that for my son.

For her family, which included a number of people working in blue-collar fields, postsecondary alternatives to college had always been on the table. For other school leaders, coming around to

the idea of their children not going to college was a process, but they ultimately embraced the possibility as they learned more about the potential rewards of non-college options. One such counselor told me,

> My son is a sophomore in high school … and I said to him last week, 'Hey. There's an electrical pre-apprenticeship pre-meeting. Have you thought about that?' And honestly, two, three years ago, I wouldn't have that conversation, because I saw him going to college.

Having learned more about promising four-year college alternatives, the counselor had begun encouraging his son to explore a range of postsecondary options to ensure his choices made the most sense for his interests and goals.

Despite their own receptivity to this shift in thinking, many of the administrators and counselors had expected teachers in their schools to resist the idea of preparing students for sub-baccalaureate career trajectories. Because they perceived teachers as having limited personal experience with careers that did not require advanced degrees and as having attended high school and college during an era in which higher education was widely considered to be the key to career success, they worried that teachers might fall back on stereotypes about alternative career training. To expand the teachers' conceptions of successful postsecondary trajectories, school leaders and counselors designed professional learning sessions on the modern job market (often showing Fleming's "Success in the New Economy" video), established teacher committees on improving curriculum-workplace relevance, and instituted staff programs to bring teachers up to speed on district goals for career-relevant learning. In several of the districts, administrators or counselors successfully applied for state grants to sponsor their teachers' participation in the TIW program. By sending groups of their teachers to spend a week during the summer with local companies in high-need industries, district leaders sought to build up their teaching forces' first-

hand knowledge of day-to-day life in modern industry. In turn, the teachers could impart accurate and up-to-date information to their students about the local world of work.

The administrators and counselors told me that they were pleased to find that teachers were, for the most part, enthusiastic about the shift in how the schools were conceptualizing postsecondary success. Indeed, I observed one meeting during which a school board member explained that, since he joined the board in 2000, he had been pushing for ways to support students who were not going to college. When the superintendent responded that their high school's principal was increasingly doing just that, the board member responded, "And God bless him. We need leaders like that." At a TIW professional learning session I observed, classroom teachers were especially receptive to the prospect of helping students avoid college debt. If students could find well-paying careers without taking on student loans that would stunt their ability to reach adult milestones, such as buying houses, the teachers explained that they were entirely in support of college alternatives.

Exceptions to this warm reception occurred at two districts in the region with the wealthiest student bodies, which were located within commuting distance of nearby large cities. While the educators from these schools who I spoke to were personally in support of the shift away from CFA, they said that the district's efforts to promote a variety of postsecondary pathways had begun entirely in response to the state's changes in school evaluation and the new CEW standards requirements, rather than as an internal commitment to college alternatives among district leadership. It had been a longer process than in other districts to convince their school board members and teachers that investing in stronger career programs would not threaten their reputation for strong academic achievement. This concern reflected a long history of high academic expectations from parents, who differed demographically from other parents in the

region. Unlike other districts with more rooted populations, the wealthier districts had large numbers of families who had moved to the region from elsewhere and used it as a bedroom community while the parents worked as professionals in nearby cities. A counselor from one of these districts described the college-going norm that the school leadership faced:

> Our parents, for the most part, are very well educated and [believe] college, it is for everyone. We have students that go to the elite colleges, so there's all that pressure. And then you have that second tier of kids, they're still expected to go to college. And then when you go into general level English classes and you ask, "How many of you are attending college?" They all raise their hand. And so, our district as a whole started two years ago with trying to make sure kids are going where they should be going. So, obviously, they should not all be going to college.

To support programming that aligned with the new state accountability system, the administration tasked a small group of teachers who had high buy-in to the new career standards with shifting mindsets among teachers, students, and parents. While the teachers succeeded at convincing students to participate in more career exploration activities, the college-going ethos remained.

### *Education as Workforce Development*

Participants felt that failing to promote the full array of career options did a disservice not only to their students, but also to the community. Every participant I spoke with, industry representatives and educators alike, believed that a major, if not the primary, role of public education was to prepare a strong workforce to meet the needs of local industry. Only two of the participants (both educators) also mentioned the need to prepare students for careers in a national or global economy. Exposing students to the most in-demand local career options, participants reasoned, would increase the community's talent pipeline, providing companies with a competitive labor force that would encourage them to continue operating and expanding locally. One assistant principal argued,

> What we have to do as a school community, we have to help prepare our students to take advantage of those [local industry] opportunities because it also puts belief into the business owners that we're partners in this and that we're trying to get that pipeline and that they don't move somewhere else. So that's key … You know, we have some well-established businesses in our area. It's kind of uncommon for such a small local region. We need to make sure that we hold on to them because that's definitely the stability of our community. There's no doubt about it.

Clearly, they felt that schools could play a role in maintaining an attractive local labor pool, which in turn would ensure the longevity of local industries that had declined elsewhere.

But why should local industry needs be the concern of schools in the first place? According to some of the school leaders, the prospect of losing local businesses due to an under-skilled labor force was a problem they themselves had contributed to over the years by encouraging students to attend four-year colleges. To fulfill their role as leaders of central community institutions, and to make up for their perceived contributions to the skills gap, the educators felt obligated to provide a viable local workforce, as the following two educators explained:

> I think the other piece is, again going back to the push for the four-year college, we lost our skilled labor force. It drastically got reduced and I think it's our responsibility to try and build that up … Obviously that's a win-win, too, because again it's an economic boon for the paycheck, but it's also an economic boon for the community.

> So, we want to offer these types of skills to our community as well. It's just my way, our way, of giving back to our community. We are a blue-collar community, and it's a great community and a hard-working community … We are the hub, so this is it; and so, it's just our responsibility to try and give back. And like I said, to try and give kids an opportunity to be successful, and to stay in the area, I think that's awesome … I think, to try and keep things going here, the workforce, to keep it in decent shape, that's just one way we're just trying to give back.

Though they identified local workforce development as the primary function of the school, apparent in these responses was a belief that fulfilling this function inherently supported

individual students, providing "an economic boon for the paycheck" and "giv[ing] kids an opportunity to be successful" even if higher education was not in their future.

When further pressed on the relationship between strong local businesses and student outcomes, educators explained that not only did industry provide individual students with well-paying jobs, it also served as the bedrock of the community, ensuring that families could provide for their children's wellbeing. An assistant principal argued,

> …it definitely impacts the school when families are able to have a steady wage and be able to support a traditional household. Then that provides that student with the basic needs, food, shelter. Those types of basic needs where then they can come prepared to school to learn, instead of worrying about where their next meal is or where they're going to be living, you know? I think that is more of a social need. I think the businesses have a direct impact on that. The jobs that they provide, the wages that they are able to provide.

In his view, and in the views of many of the education stakeholders I spoke with, strong local industry prevents social dysfunction, which enables children to engage fully in education. In turn, schools are responsible for providing each and every student with the skills and competencies needed to become a productive, working member of the community. This complementary relationship meant, according to the educators, that schools needed to expose their students to attractive, locally in-demand careers, rather than encouraging them to leave the community.

However, no matter how well schools succeed at preparing a strong local workforce, economic trends outside of their control can shape local businesses' long-term viability and skill demands. High local demand for skilled manufacturing workers over the past several years had led schools to develop a range of manufacturing-oriented CTE programs, but the fact remains that companies have yet to recover all the jobs lost during the Great Recession. I asked school leaders, representatives from workforce development organizations, and employers in the

manufacturing industry whether they were concerned about the future of the local manufacturing base and the jobs it provided. The participants acknowledged that the nature of manufacturing jobs was changing. Increasingly, they said, manufacturers were offering not the unskilled shop-floor jobs that had once made up the bulk of manufacturing jobs, but instead, jobs that required specialized technical skill sets – as well as reading, math, and soft skills such as problem-solving and communication that would allow employees to rapidly learn and apply new technologies. A handful of educators and manufacturing employers acknowledged the possibility that the number of jobs in the manufacturing industry could eventually be reduced due to automation, but they felt that this was unlikely to happen any time soon. The small "mom and pop" manufacturers that composed the majority of regional industry had communicated to school leaders that they were unlikely to make the costly investments in industrial robotics in the near future. Furthermore, once local companies do begin transitioning to automation, the participants reasoned, societal dependence on technology will be so great that employees with mechanical skillsets, who understand the fundamentals of what robots are programmed to do, will be increasingly in demand for monitoring, troubleshooting, and consulting. They summarized this argument succinctly by repeating the phrase, "We'll still need someone to fix the robots."

Participants' predictions about the future of manufacturing work over the coming 5-10 years were supported by data from local workforce development and industry advisory boards, which in turn drew on occupational predictions calculated by the PA Department of Labor and Industry. While overall numbers of manufacturing jobs were expected to decline slightly, demand for those jobs was predicted to grow rapidly through 2026 due to mass retirements of experienced workers outpacing job losses. The highest demand was predicted for skilled workers such as welders, CNC machine operators, and industrial machinery mechanics. For other trades,

including construction, plumbing, and electrical, both absolute job numbers and demand were expected to grow in the coming years (Pennsylvania Department of Labor and Industry, 2019).

In turn, local employers in manufacturing and the trades sought out workers who could demonstrate foundational technical skills and soft skills, rather than workers with degrees signaling broad academic competence, such as the Bachelor of Arts or general associate degrees. While a small proportion of jobs at their companies had a BA as a minimum requirement, the employers explained that the greatest shortages were in sub-baccalaureate skilled positions. Specifically, the manufacturing employers explained that they struggled to find workers with the mechanical aptitude, facility with applied mathematics (including trigonometry), and knowledge of advanced technology needed for their skilled positions. All the employers emphasized the need for soft skills, which they defined as work ethic, reliability, and punctuality, along with interpersonal skills and willingness to continually learn and adapt to changing technologies.

Through their school-industry networks, the school leaders were highly attuned to the skillsets local employers prioritized. In turn, that felt that general degrees were decreasing in value, not only due to degree inflation, but also because the knowledge and aptitudes they represented were not necessarily transferrable to industry projects and tasks. Seen in light of the view that education is first and foremost about attaining the skills necessary for a job, the idea of encouraging students to pay increasingly high tuition just to jump through seemingly arbitrary hoops seemed wasteful.

Students could start developing these competencies while still in high school, the participants explained. The more time students spent exploring local career options and learning industry-relevant skills through their high school coursework, the more money they could save on postsecondary training and the more likely they would be to pursue careers that were locally

in demand. As a result, school leaders worked to build the capacity to certify students in technical skillsets through national industry exams. They also worked to ensure students could learn and demonstrate competence in soft skills. A handful of districts worked with local businesses to develop measures of students' soft skills – including attendance, interpersonal competencies, and time management – that schools could help to teach and assess. They then developed certifications that students demonstrating these skills could earn to signal their workplace readiness to local employers. Theoretically, these students would have a leg up in the local labor market due to the school's endorsement of these skills. The certifications never used the language of "soft skills," however, which was a term that a number of the educators took issue with, arguing that the skills are not soft but critical, so "what's soft about it?" To impart the respectability and importance they felt the term "soft" lacked, they developed various other names for their local employability certifications.

Given the enormous benefits they perceived of vocational learning, some of the educators considered time spent on general distribution requirements to be woefully inefficient. Before Pennsylvania's transition to a new school accountability evaluation system, one principal voiced a widely shared frustration with state standards that did not appear to reflect local labor needs: "If I'm going to be a welder, why do I need to know biology? Or English literature?" Students would be better prepared for the postsecondary transition, she went on, if they could concentrate on coursework personalized to their career aspirations, learning the technical skillsets and soft skills that would be needed on the job. Vocational learning was just as important as traditional academics, she argued, and it should be treated as such. Others acknowledged the importance of providing students with an education broad enough to explore a range of interests and talents, but they felt that the way in which schools had implemented general education in the past had

sometimes sacrificed depth for breadth. Students should have the opportunity to engage in a specific occupational pathway deeply enough to gauge how well it aligned with their talents and interests, they explained.

**Chapter 3 Discussion**

Policymakers differentiate between CTE and vocational education of the past by emphasizing that it prepares students for both college and careers, expanding postsecondary options without pigeonholing students into any one pathway. However, researchers caution that as CTE's popularity grows, its ensuing adaptations in more and more contexts create the potential that schools will unintentionally resurrect old distinctions between academic and vocational tracks (Hodge et al., 2020). Findings from this study show that high school education leaders and their partners in industry and workforce development indeed differentiated between CTE and traditional academic trajectories, framing CTE as a way of preparing students primarily for sub-baccalaureate careers rather than BAs. Yet far from being unintentional, this distinction was integral to how education stakeholders constructed local understandings of the purpose of CTE. Participants considered preparation for sub-baccalaureate careers a much-needed corrective to years of pushing CFA. Some school leaders even aimed to reduce college-going among their graduates. Approaching these findings from the perspective of sensemaking theory helps us understand why school leaders and their industry partners felt such a strong need to frame CTE as a way of providing students with four-year college alternatives.

Sensemaking theorists recognize that the enactment of education reforms in schools is a process of adaptation based on local, contextualized, collective interpretations of the reform and its goals (Coburn, 2001, 2006; Spillane et al., 2002; Weick et al., 2005). School leaders are essential actors in constructing interpretive frameworks and defining the parameters by which

reform success will be judged (Coburn, 2005, 2006). For superintendents, principals, and school counselors in the "Oaksburg" region of Pennsylvania, growing enthusiasm for CTE reflected frustrations with the student debt crisis and concern about a growing worker shortage in middle-skill occupations. While these frustrations are shared by many educators nationwide, contextual factors – including the excessive student debt levels in Pennsylvania, combined with the community's reliance on manufacturing – heightened Oaksburg educators' concerns as they interacted with industry partners.

Heightening their frustration with CFA was many education stakeholders' personal commitments to upholding the dignity of all work that contributes to society, including the blue-collar labor that has become low-status as credential requirements for entry into most middle-class careers has risen. These commitments stemmed from participants' personal roots in the blue-collar towns in which they worked, where low-educated workers could historically attain middle-class lifestyles through well-paying manufacturing jobs. Oaksburg communities were more egalitarian than most, with an average Gini index that placed their equality of income distributions within the top 20% of communities nationally. School leaders had spouses, parents, siblings, and others within their personal networks who worked in blue-collar jobs, and they felt that these jobs should be accorded the same respect and consideration by schools as white-collar professions. Chapter 4 will delve deeper into the constructions of occupational status that participants put forth to defend blue-collar labor.

Participants argued that the CFA approach had served the interests not of their students but of "the system." That is, they believed that schools themselves had helped to legitimize a costly credentialing system that diverted students from sub-baccalaureate degrees, then justified the relegation of students without four-year degrees to futures of low-wage, unskilled, and

unstable service sector work (Rosenbaum et al., 2017). Based on these interpretations, what was once a good-faith effort to improve equity through high expectations now seemed paternalistic, a "we know what's best for you" approach that ignored the pyramidal "1:2:7" shape of the occupational structure and the need for high-quality career preparation, even for those who do not achieve the highest levels of education. They contested a system in which the imperative to give students a chance to compete for jobs with high social standing overshadowed the need to ensure that students had access to rigorous training for other occupations (Labaree, 1997; Newman & Winston, 2016).

Given these frustrations, school leaders were very receptive to a YouTube video first promoted by the state Department of Education about the need for a broader vision of postsecondary success, which advocated preparing young people for middle-skill occupations. As they circulated this video within their networks and discussed new state career readiness requirements, CTE appeared to provide a solution for the problems associated with CFA. The exceptions to the enthusiastic reception of CTE were schools in wealthy districts with easy access to nearby cities, illustrating that sensemaking about CTE in comprehensive high schools depends on the problems to which it is framed as a solution (Coburn, 2006). In districts where most families could support their children through college graduation, the problems associated with CFA were less resonant and CTE held less sway.

As leadership at most schools worked to upgrade their CTE programs, local industry and workforce development representatives were important actors in shaping adapted understandings about the purpose of these programs. Projecting severe worker shortages, employers in manufacturing, construction, and the building trades were highly motivated to reinforce ideas about training in traditional vocational fields as financially low-risk pathways to "family-

sustaining wages." Welcoming the grants that the state made available, they partnered with schools to create programs that met state funding requirements by advising on curricula and developing internship and pre-apprenticeship opportunities. They also donated equipment and other resources to schools. The ability of education leaders to garner resources to support their framing of problems and solutions around educational policies lends further authority to school leaders' policy interpretations (Anagnostopoulos & Rutledge, 2007). The resources that these partnerships made available, in turn, bolstered the legitimacy of administrator and counselor views that traditional vocational CTE could help schools meet their obligation to local workforce development, while simultaneously providing promising career options to the students that the CFA mentality had ostensibly left behind.

School leaders framed this work as a matter of educational equity, which they considered as opportunity to receive an education relevant to one's career goals, regardless of whether that career required four-year college. In this way, they did not consider the prospect of potentially cooling out some students' aspirations for higher education to be particularly problematic, since the educators viewed both academic and vocational coursework as valuable and high-status. If anything, this was an intended outcome insofar as it prevented four-year college dropouts.

A number of scholars have pointed out tensions in the multiple commitments that the U.S. education system has endeavored to meet (e.g., Clark, 1980; Coleman, 1968; Newman & Winston, 2016; Shweder, 2010), including commitments to equal opportunity, social mobility, and efficiency of workforce development (Labaree, 1997). Sociologists argue that conflict over which of these goals should take precedence as educators implement new reforms has undergirded historical ambivalence toward vocationalism, propelling pendulum swings in movements for and against vocational curriculum tracking (Labaree, 1997; Newman & Winston,

2016). The findings from this chapter demonstrate how implementation of the latest wave of vocational reform is fundamentally rooted in education stakeholders' locally and temporally situated interpretations of education's goals and how to achieve them in a changing opportunity structure. The education stakeholders in Oaksburg elevated the workforce development function of education, while challenging the status hierarchy that pitted this goal against the commitment to equal opportunity. In turn, they supported actions that directly shifted the dynamics of educational stratification, sending more resources and support toward students with lower levels of academic achievement.

While the Oaksburg education stakeholders' interpretations of CTE's goals and design contradicted CTE policymakers' prioritization of academic rigor and college readiness efforts, their ability to adapt CTE reform to their local contexts may have contributed to its successful reception in schools. By framing certain elements of CTE as a solution to the problems of credential inflation and a local skills gap, they were able to translate its benefits for their students and the broader community and achieve buy-in from their school boards and teachers. As they developed programs that allowed students to concentrate in a vocational field, the educators ramped up marketing to students and parents about the importance of career-oriented education planning, as the following chapter will show.

# CHAPTER 4: EDUCATION STAKEHOLDERS' EFFORTS TO RAISE THE STATUS OF TRADITIONAL VOCATIONAL CTE

The rebranding of vocational education as "career and technical education," a name change made official in the 2006 federal reauthorization of the Perkins Act (Perkins IV) and carried through into the 2018 reauthorization (Perkins V), reflects policymakers' efforts to distance modern vocational learning from the stigma of low-quality programs of the past. The legislation elevated CTE's status through measures that aim to enhance CTE students' preparation for both college and careers, tying federal CTE funding to accountability requirements for academic achievement and stronger links between high schools and postsecondary institutions. It also recognized a more expansive variety of CTE coursework. In addition to what Malkus (2019) terms "traditional vocational" fields, such as manufacturing and construction, CTE encompasses the fields of STEM, healthcare, computer science, and others that require higher levels of postsecondary training. By offering academically rigorous CTE coursework with no within-subject levels and minimal prerequisites, schools can theoretically both reduce the stigma of CTE and encourage participation by students from all achievement levels (Castellano et al., 2003; Hodge et al., 2020; Puckett & Gravel, 2020). In other words, policymakers aim to blur the boundaries between vocational and college-prep courses, allowing CTE to borrow the status associated with academic coursework.

However, as shown in Chapter 3, educational stakeholders in the Oaksburg region constructed interpretive frameworks of CTE's meaning and purpose that were inconsistent with the broader policy goals of transforming CTE into programs that prepare students for both advanced degrees and careers. Rather than emphasizing CTE's college relevance, they reified distinctions between college-prep and vocational coursework, with the goal of creating efficient,

financially low-risk pathways toward sub-baccalaureate careers. They made sense of such pathways as a way to democratize access to middle-class careers in the midst of a student debt crisis while simultaneously addressing the skills gap that industry leaders claimed would threaten local businesses' long-term viability. In this chapter, I demonstrate how education stakeholders in Oaksburg translated these beliefs into action through work to elevate the status of CTE and sub-baccalaureate careers in the eyes of students and parents.

First, I briefly review some historical and modern efforts to establish and improve esteem for vocational learning. I situate these efforts within the sociological literature on occupational prestige, highlighting work that challenges classical understandings of prestige as structurally determined by a combination of education and income. This work conceives of occupational prestige as multidimensional, reflecting both social class and efficacy in promoting cultural conceptions of goodness and order (Abbott, 1981; Freeland & Hoey, 2018; Weber, 1978). I then examine how education stakeholders in Oaksburg schools worked to raise the prestige of CTE, particularly the traditional vocational CTE most likely to lead to careers that require less education than a four-year college degree. Throughout their efforts, education stakeholders drew on a rationale for occupational prestige that incorporated income, social contributions, and specialized expertise, but decidedly not general educational credentials. However, in their work to elevate CTE's status, education stakeholders at times exaggerated the long-term returns of pursuing a sub-baccalaureate credential relative to a BA.

After presenting these findings, I discuss potential implications for student decision-making and socioeconomic stratification in college access. The education stakeholders' challenge to the BA as the benchmark of class-based merit accorded with their assertion that a "one-size-fits-all" approach to postsecondary preparation should be replaced with one that allows

students to pursue the pathway that best matches their personal interests and long-term goals. However, to the extent that they misrepresented sub-baccalaureate degree earnings, educators' efforts may have been insufficient for providing students with accurate information on which to base the development of postsecondary aspirations that aligned with their personal goals. Given these findings, Chapter 5 will then further examine the context of CTE student decision-making and its consequences for students' educational aspirations.

**The Prestige of Vocational Learning**

The first major wave of vocational education emerged from the progressive movement's pragmatic philosophy, which held that "thinking through doing" was the basis for participation in a democratic society. Pedagogical progressive John Dewey (1923) argued that vocational learning should be considered as estimable and necessary as classical academic learning. He imagined an "education through occupations," establishing a vision of pragmatic vocational schooling as an intellectual and moral enterprise. Rejecting the philosophical dualisms of mind/body and theory/practice that he perceived to underpin the classical academic curriculum, Dewey instead argued that hands-on work applied to practical occupational goals was ideal for instilling the motivation, intellectual engagement, and exercise in planning and self-direction typically reserved for society's ruling class. Combined with training in history, science, and civics, vocational engagement for all students could mold autonomous citizen-workers with the critical capacity to question exploitative social arrangements. According to Dewey's vision of vocational learning, vocational and academic learning would be integrated and inseparable, obviating any status hierarchies between practical and theoretical education.

However, not all forms of progressivism at the turn of the 20th century considered the primary aim of vocational education to be the development of motivation and self-direction. In

contrast to pedagogical progressives, administrative progressives advocated for a differentiated, rather than integrated, curriculum. Students in the vocational track would receive the specialized training for a specific occupation that Dewey warned against, while students in the academic track would receive the academic foundation to pursue higher education. Administrative progressives believed that this would maximize efficiency in schools, matching student ability with a curriculum that would prepare them for their future occupational roles. As this view became predominant in practice for reasons summarized by Labaree (2005), schools constructed academic "merit" in ways that privileged the symbolic capital of middle- and upper-class white children, thereby justifying the channeling of economically disadvantaged and minority youth into vocational tracks that became under-resourced (Bowles, 1972; Bowles & Gintis, 1976; Gamoran, 1996; Kohn, 1977). The general consensus among sociologists of education was that these tracks became "dumping grounds" for students who were written off as undeserving of significant educational investments. Thus, vocational education maintained schools' role in reproducing class stratification in the face of an influx of working-class and immigrant children in the nation's high schools. Growing recognition of these tracking practices eventually helped to propel the standards-based reform and corresponding CFA movements of the 1990s and beyond, which insisted as a matter of social justice that all students be held to the same high academic expectations, regardless of social class or racial background (Rosenbaum, 2001).

In turn, the revitalization of vocational education in the form of CTE had to contend with a long history of stigma rooted in the idea that vocational learning limited students' social mobility and reproduced social stratification. It comes as no surprise, then, that a primary justification of CTE is that, unlike prior models of vocational education, it keeps doors open for students to pursue higher education by reintegrating academic rigor into the curricula of

vocational programs. To improve the reputations of their students and of vocational learning, regional vocational high schools nationwide have gone to great lengths to improve scores on standardized tests and increase rates of four-year college enrollment. They have also developed, adopted, and promoted STEM curricula with a strong emphasis on college readiness for access to professional STEM careers (Newman & Winston, 2016). In their study of a school implementing an engineering CTE program, Puckett and Gravel (2020) found that administrators, counselors, and teachers drew on engineering's dual categorization in the broader policy sphere as both vocational and academic in order to raise its status and attract high-achieving students. They supported this categorization through organizational processes that created overlapping academic and vocational spaces, teachers, and engineering activities. In turn, engineering students were exposed to peers who were exceptionally diverse in socioeconomic status, race, and achievement levels, as well as coursework that was both academically and technically rigorous.

Emphasizing CTE's potential college relevance has indeed helped to improve public perceptions of vocational schools (Newman & Winston, 2016). CTE in engineering, computer science, healthcare, and other "new era" (Malkus, 2019) fields with clear relevance for college-level coursework may be particularly effective at promoting the idea of programs as high-status and expanding student enrollment. However, not all CTE overlaps with college-relevant fields in this way. If garnering support for CTE and improving enrollment depends on borrowing from traditional hierarchies that measure status by college relevance, it is unclear how traditional vocational courses in manufacturing and the trades – which have been shown to reduce enrollment in four-year colleges (Giani, 2019) – could overcome their historical stigma.

Yet defending the status of traditional vocational programs and other forms of sub-baccalaureate career education is important, according to some CTE advocates. Students who

tend to gain the most from CTE – low-achieving male students with low college prospects – often concentrate in traditional vocational fields and earn higher wages than their non-CTE counterparts as a result (Malkus, 2019). Furthermore, as Newman and Winston (2016, pp. 59–60) point out, defending vocational learning only to the extent that it conforms to academic status hierarchies not only devalues vocational learning as an end in its own right, ignoring its unique contributions to students' intellectual and personal growth, it also reduces the time available for students to learn technical competencies, which is sacrificed as schools carve out time for academic test prep and college-oriented academic curricula. In turn, while college-oriented measures of status may raise the status of vocational schools, they ultimately undermine the value of vocational learning itself.

College-based status categorizations reflect traditional sociological measures of occupational prestige, which are based on surveys that ask individuals to rank various careers according to their "general social standing" (Duncan, 1961; Hauser & Warren, 1997; Nakao & Treas, 1994; Treiman, 1977). The resulting occupational prestige hierarchies, which have remarkable consistency across social groups (Hout & DiPrete, 2006; Reiss, 1961; Treiman, 1977), strongly correlate with objective income and education measures of stratification (Duncan, 1961). If occupational prestige indeed universally has a basis in the level of education an occupation requires, it is conceivable that vocational learning with low potential for higher education will always be considered low-status, leaving schools offering traditional vocational CTE open to the critique of tracking a subset of students into undesirable careers. However, sociologists disagree over what occupational prestige rankings actually measure (Hauser & Warren 1997). Featherman and Hauser (1976, p. 405) argue that asking survey respondents to rank occupations based on their "general social standing," rather than on prestige or status,

reflects respondents' "error-prone estimates" of each occupation's objective socioeconomic features. The resulting occupational prestige scores have low construct validity as a measure of the status, respect, or esteem accorded to various occupations (Bukodi et al., 2011).

A long line of sociological work has theorized how symbolic hierarchies are shaped by subjective perceptions and cultural practice, as well as by structural conditions (Abbott, 1981; Bourdieu, 1984, 1986; Michèle Lamont & Lareau, 1988; Tumin, 1953; Williams, 2006; Zhou, 2005). For example, Lamont argues that white working men in the United States with low socioeconomic status defend their own social status based on a morality centered around individual work ethic:

> They find their self-worth in their ability to discipline themselves and conduct responsible yet caring lives to ensure order for themselves and others. These moral standards function as an alternative to economic definitions of success and offer them a way to maintain dignity and to make sense of their lives in a land where the American dream is ever more out of reach (2000, pp. 2–3).

According to Abbott (1981), the broader public's view of occupational status reflects not a profession's income, education, or even power, but rather the extent to which the occupation involves applying expertise in the project of making contact with, ordering, and containing disorder, such as by imposing justice on criminals or healing the sick. For example, because she works the frontline in the effort to contain illness, the E.R. doctor is held in higher public esteem than the better-paid, more influential hospital administrator. Freeland and Hoey (2018) point out that the Harris Poll, which consistently asks respondents to rate occupations' "prestige," rather than social standing, consistently finds that frontline occupations such as nurses, firefighters, teachers, and clergy are rated among the highest in prestige, much higher than their education and income would predict. Freeland and Hoey argue that this measure of occupational prestige

not only has higher construct validity but is also more theoretically consistent with Weber's conceptualization of status.

According to Weber (1946a), distinctions in social esteem are separate from class hierarchies. Status refers to social groups' culturally accorded honor and privileges, rather than financial capital, and groups high in status enjoy deference from others even without vast amounts of wealth. Freeland and Hoey (2018) build upon Weber's concept of status to construct a multidimensional measure of occupational prestige that reflects social class as well as cultural evaluations of goodness and honor, measured as survey respondents' evaluations of the deference culturally accorded toward those in specific occupations. Consistent with Abbott's observations on occupational prestige, they find that an occupation's status depends on the extent to which it involves actively carrying out a social good via application of professional skill, with or without formal education. The resulting prestige hierarchy closely aligns with Harris Poll data, elevating professional and non-professional occupations alike – including nurses, teachers, firefighters, and police.

These findings suggest that schools have a broader basis on which to argue for the worth of vocational learning than college relevance. By emphasizing the contributions that people in technical and hands-on occupations can make to the social good along with the respectable incomes they can earn, educators could justify preparing students to pursue these careers. In Oaksburg, education stakeholders working to defend and elevate traditional vocational CTE did just that.

**Findings**

The findings in this chapter are derived from the same methods described in Chapter 3. Educators' efforts to market CTE and sub-baccalaureate careers generally took three forms. First,

they shared information that challenged pre-existing beliefs about the relationship between education and income, often exaggerating the returns to sub-baccalaureate degrees. Second, they told stories about exceptional students who had successfully obtained well-paying and socially valuable careers with low levels of formal education. Finally, they enacted rituals and symbols to honor pathways toward sub-baccalaureate occupations, highlighting their importance to society via contributions to the social good. Administrators and counselors underscored that they were not necessarily discouraging students from attending college. Instead, they presented their schools' investments in vocational education and opportunities to explore sub-baccalaureate careers as an expansion of existing opportunities that students could choose to partake in only if they were interested, rather than a redirection of resources away from college-prep programs.

***Strategy 1: Challenging pre-existing beliefs about education, income, and careers***

The educators acknowledged that, for many years, they themselves had contributed to a bias in favor of four-year colleges, which they now felt had been misguided. In turn, the administrators and counselors made numerous efforts to provide students and parents with what they considered to be a fuller picture of the considerations students should take into account when planning their postsecondary trajectories. Screenings of Kevin Fleming's "Success in the New Economy" YouTube video were commonplace in career assemblies and parent meetings, and educators drew on Fleming's explanation of the 7:2:1 ratio to argue that an overproduction of BAs had resulted in credential inflation that cheapened the value of a BA on the job market. Administrators at one school frequently urged students and parents, "Ask your waiter or waitress next time you go out to eat what college they went to. And what did they study. We don't want to create all the waiters and waitresses in the world."

Education stakeholders also encouraged students early in their high-school years to investigate and plan out the training they would need for their chosen career path, hoping this would help students take advantage of as many opportunities as possible to subsidize their higher education. Whenever possible, students were encouraged to "earn while you learn," having employers pay for their labor as well as their training through programs such as apprenticeships and employer-sponsored tuition grants. One career counselor asked students to consider the payoffs of different types of postsecondary education options that lead to the same career. He shared the following:

> I do this with students a lot, I'll say to them, 'Okay, you and I are seniors. We're both gonna graduate. You're going to go into apprenticeship, and after three years you're gonna have a Journeyman Electrician Certificate. I'm gonna go to [local tech college], which I respect them, I like them, but I'm gonna go there for two or four years and spend a bunch of money. You're going to, after three years, have been paid for three years of being an apprentice, and have the same certificate I will, but I'll be $60,000 to $120,000 in debt.' So, I ask students, "Who's the bonehead?…" And then if you draw that even further back, "why wait until after you graduate? Why not invest in pre-apprenticeship?"

However, in their enthusiasm for sharing information about low-risk, high-reward learning opportunities, the participants did not always communicate a complete picture about how the expected earnings of different postsecondary degrees compared. At one school, a counselor made it a point to demonstrate that sub-baccalaureate degrees could command higher salaries than BAs and advanced degrees. Showing students a PowerPoint slide with a list of occupations, he asked students to guess the salary and level of education that each job required. As he expected, students guessed that the occupations with higher education requirements had higher salaries or wages. In the next slide (Figure 1), the counselor revealed the actual estimated hourly wages and education requirements for each occupation. Students were surprised to see that the jobs that required associate degrees or on-the-job training earned the highest wages,

those that required BAs earned the second-highest wages, and those that required master's degrees had the lowest wages. While the counselor acknowledged that this and other examples he used were extreme, he did not explain to students just how far they varied from the norm. (Workers with master's degrees are expected to earn, on average, over a million dollars more than typical certificate holders over a lifetime [Carnevale et al., 2011]). The message the counselor intended to communicate was that more education does not always result in higher income. However, his examples suggested there was no correlation or even an inverse correlation between education and income.

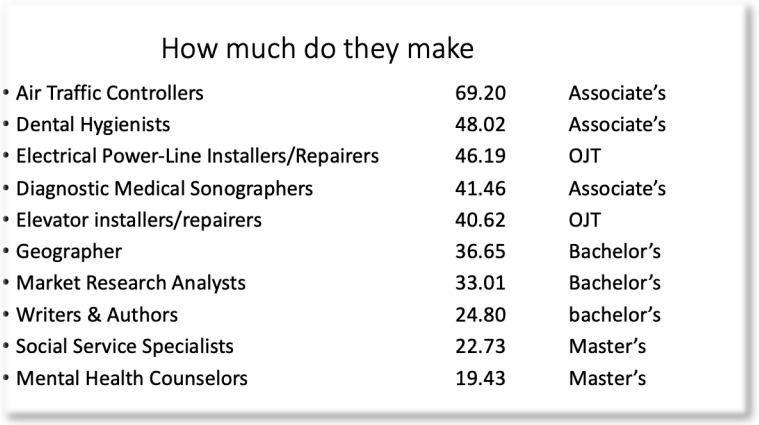



Figure 1: PowerPoint Slide Shown to Students During Career Counseling

While emphasizing the variation in earnings across career fields that made some associate degrees more lucrative than some BAs, education stakeholders also rarely pointed out the greater earnings of higher degrees within fields. For example, the CTE director who emphasized that a certificate in information technology could yield a starting salary as high as that of a first-year teacher at his school did not mention that a person with a BA in IT could earn almost double that of the certificate-holder. The participants also failed to communicate that low-income students, female students, and students of color tend to receive a higher premium on a four-year college

education relative to sub-baccalaureate degrees than their more privileged peers (Brand & Xie, 2010).

Disillusioned with the effects of degree inflation, participants also frequently underestimated the long-term premium of BAs relative to sub-baccalaureate degrees. In interviews and at the meetings I observed, it was not uncommon to hear participants share exaggerated estimates of the average four-year degree debt load. They implied that by avoiding this debt and starting work earlier, young people could come out ahead of their more highly educated peers. In the words of one pre-apprenticeship instructor,

> I tell most of the kids, "Your buddy that's going to go to college is going to probably be in the hole for close to a quarter of a million dollars or something like that. Where if you look at the wages you're going to be making in those four years, you'll probably have made almost that much money."

While Pennsylvania college students, especially those from low-income families, have some of the highest debt loads in the nation, on average they leave college with approximately $37,000 in student loans (Gonzalez et al., 2019), nowhere near the figures of upwards of $100,000 that participants often referred to. In fact, fewer than 5% of student loan borrowers hold six-figure debt, and those who do are almost exclusively from postgraduate programs (Looney & Yannelis, 2018).

Having argued that college is not always a financially efficient pathway to a high-paying career, the educators sought to correct inaccurate beliefs about sub-baccalaureate career opportunities as uniformly unskilled and low-paying. In compliance with state career standards, students explored the training requirements and salaries of careers with varying levels of degree requirements in fields they were interested in. Schools supported this exploration by hosting career assemblies that showcased presenters with all levels of postsecondary education, and their college and career fairs included representatives from tech schools, apprenticeship programs, and

companies hiring employees directly out of high school. A school administrator explained that, whereas their career day used to primarily feature doctors and lawyers and other professionals, now students could see people "in their own community," such as welders and HVAC technicians. At one career fair I observed, all 16 national career pathways were represented, and every presenter offered students opportunities for shadowing, internships, part-time work, or full-time work. Districts that were CSIP members strongly encouraged students to participate in the CSIP career development programs, multi-day structured visits to businesses in a particular industry that provided information on careers at all levels of training. Additionally, counselors in most districts arranged their own field trips to tour local companies and learn about the levels of postsecondary training required for the different positions they saw. Teachers – having participated in districts' trainings about the skills gap and career opportunities for sub-baccalaureate credentials – shared information in their classrooms about how the subjects they taught could be used in jobs with a variety of degree levels.

In all this career-related programming, schools in areas of the Oaksburg region most dependent on manufacturing made special efforts to challenge pre-existing beliefs about the manufacturing industry. Administrators and counselors repeated industry representatives' insistence that 21st-century manufacturing is no longer "dirty, dark, and dangerous," as it had been stereotyped in the past, but instead has transitioned into an era with clean facilities, strong employee protections, and engaging work that draws on a range of skills, rather than repetitious drudgery on the factory floor. An annual event organized by the CSIP and local chambers of commerce showcases manufacturing careers by inviting manufacturing companies across the region to host school visits and demonstrate the importance of STEM in manufacturing. On one factory tour that I observed, a young mechatronics apprentice demonstrated a wide range of

complicated skills that he used on a daily basis, encouraging the high school students to consider such a position "if you want to use your hands and your head."

### *Strategy 2: Circulating CTE Success Stories*

In addition to sharing information that challenged student and parent misconceptions about college and careers, the educators frequently promoted examples of students who had pursued nontraditional postsecondary pathways and reaped great rewards for doing so. As one career counselor put it, "I think success is best defined through individual stories." Multiple schools described inviting former CTE students who had gone on to secure high-paying jobs in the trades to speak at school events: "So, we started bringing our graduates in who were making six figures as welders and just point and say, 'There's a life out there.'" While the median annual earnings for a welder in 2018 was just over $42,000 (US Bureau of Labor Statistics, 2019b), participants felt that it was important to showcase students who had capitalized on opportunities for continued growth and advancement in the trades in order to achieve exceptionally high wages.

The schools' newsletters and brochures featured students who had participated in pre-apprenticeship programs and landed jobs before even graduating. In these materials, schools made it a point to highlight their female students training for positions in male-dominated trades, such as one girl who was both a cheerleader and a welding pre-apprentice with a paid apprenticeship lined up to start directly following graduation. In an interview with the local paper, she encouraged her peers to reconsider the idea of following their passions and instead consider how they could align their talents with needed jobs that could provide long-term security.

At another school, administrators enjoyed telling students and parents about two CTE graduates who had immediately entered the workforce and started a manufacturing facility that, six years after opening, was earning more than $1 million in annual sales. The article about the graduates in the school's newsletter detailed not only their personal success, but also their dedication to the community. It explained that the facility provided local jobs and fostered much-needed machining and welding skills, helping to build the local economy and fill the skills gap. The article concludes that the high school "is a reliant source of highly-skilled workers right after high school that local businesses can trust."

The educators also told stories of students who found ways to pursue postsecondary education without taking on debt. Some of these students had done apprenticeships in construction or manufacturing, and the companies that hired them had paid for them to pursue associate degrees or BAs while working. One counselor liked to share the story of a student who selected an affordable college option and worked part-time at UPS, taking advantage of their "Earn and Learn" tuition assistance program:

> He's going to go to [local community college] for two years. He's probably going to do, likely some sort of engineering route. UPS gives $25,000 for college as long as you're lifting boxes. He's a kid that has a plan that, to me, sounds like if it fails, he's not sitting on 20 or 30 or $40,000 worth of college debt, right? If it fails, if doesn't work out.

The counselor repeatedly pointed out the implications of the student's choices if his plan "fails" not because he lacked confidence in the student, but rather because he was impressed with the student's ability to avoid taking on a level of financial risk that could derail him if he were to face the host of institutional and social circumstances that lead so many students to drop out of college.

Other success stories that were widely circulated included students who had accumulated a large number of transferable college credits while still in high school through dual enrollment and CHS programs, such as the girl who started at a public four-year school with 32 credits under her belt – almost two semesters' worth. Administrators at another school were eager to share with local reporters the story of a student who worked 40 hours per week at two part-time jobs in order to pay for dual enrollment tuition at a community college during her senior year of high school. In turn, she had graduated high school with an associate degree.

The educators also liked to share stories of students who explored a career pathway and realized, through shadowing or interning, that the day-to-day aspects of the job were not what they had envisioned. Helping students to cross careers off their lists was considered an important step in getting them closer to a career pathway that was a good fit before they had invested time and money in college credits. One assistant principal explained, "I'm not a huge believer in going to college to figure out what you want to be when you grow up. That's a very expensive journey." Instead, the educators believed that students should spend time in high school engaging in enough career exploration that they hit the ground running when they graduated. In the stories about students entering the workforce, this looked like having a job lined up that offered opportunity for further training and advancement. In the stories about students entering college, this looked like having a number of credits already completed and a major selected, so the student could make targeted coursework decisions and focus on acquiring internships and other career experience.

By telling these stories, the educators demonstrated to their students that, behind the sterile numbers in their presentations about debt loads, returns to degrees, and credential inflation, there were real students who, like them, had ambitions for the future. Through the

stories the educators selected, they aimed to persuade the students and their parents that the students who were most successful at realizing their goals were those who approached the postsecondary planning process with intentionality, committed to exploring a range of career options early so that they could take full advantage of the time- and cost-saving measures that the school had available. Successful students approached the process with pragmatism and, in the educators' eyes, a healthy dose of reality, aware that following one's dream will not guarantee a sustainable career. Instead, the educators communicated through the stories that they shared that astute students were strategic, avoiding debt whenever possible and developing skillsets that were valuable to employers.

***Strategy 3: Developing rituals and symbols to elevate sub-baccalaureate career pathways***

To support their messaging about what the schools and the local community values in terms of preparing youth for the transition to adulthood, the educators at comprehensive high schools developed new rituals to honor students pursuing careers that did not require a BA and generated symbols to communicate the elevated status of nontraditional postsecondary pathways. At special ceremonies for students who had completed pre-apprenticeship programs, district administrators and counselors praised students for pursuing in-demand careers in the trades and commended their parents for supporting these pathways. A banquet to celebrate students who completed internships provided an opportunity to recognize students learning about a vast array of careers, from those that required only a high school diploma to those that provided advanced degrees. The career coordinator described the event: "Parents were here, the business partners were here. Had a great celebration. It's probably the best banquet I've ever been involved in because we had our life skills kids to our honors and AP kids and everything in between." Some high schools also transformed spring ceremonies for celebrating seniors' college decisions into

celebrations that also included students who secured jobs or apprenticeships. At other schools, business "signing days" emulated the National Signing Day for seniors committing to a collegiate sports team by broadcasting students' commitments to work for particular companies. CTE concentrators in one district wore cords from their graduation caps symbolizing their career pathways, "so it's not just the NHS, the top 10, the valedictorian," the principal explained.

OHS celebrated the opening of their revamped CTE wing with a ribbon-cutting ceremony, which was attended by local business owners, Chamber of Commerce representatives, a local legislator, and a representative from the state Department of Education. In the days that followed, the district hosted an extended open house and, through school communications and an article in the local newspaper, invited students, parents, and community members to tour their revamped CTE classrooms. As they encouraged visitors to engage in hands-on robotics, 3D printer, and computer lab demonstrations, staff used a CAD-programmed wood cutter and laser engraver to create custom cup holders with the school logo for any guest who wanted to see how the machinery worked. Outside the building, several local food trucks fed the mass of visitors, which numbered in the hundreds as people came and went throughout the day. As I took in the cheery atmosphere during my visit to the open house, I overheard snippets of conversations among parents and children: "It's incredible." "Amazing." A man holding a young toddler murmured, "It's all for you." The pride of the administrators giving families tours was sincere; years of effort to give CTE a higher position in the school was coming to fruition, and the response of the local community appeared to be overwhelmingly positive.

As I toured another high school that had made similar efforts to revamp its CTE programming, the principal explained to me how the redesign incorporated a number of elements to make the career and technology wing of the school appealing and high-status. Each section of

hallway in the wing was freshly painted in a bright color representing the career pathway of the classrooms it led to. Robotics and engineering rooms proudly displayed 3D-printed robots designed by students; in a video-gaming room, students could work toward computer science community college credits as they learned 3D modeling; in a sound-proof recording studio, students could earn a music technology credential by working hands-on with audio equipment; outside, students could fly drones as they practiced for their FAA Remote Pilot Certification exam; and in computer labs, students could program virtual reality software and build apps, websites, and artwork for local business clients. Between classes, students in good standing could sip coffee from the school café run by culinary students. In the school's main foyer, the principal pointed out portraits of the current class of welding students working toward their NIMS certifications. The spot on the wall was once occupied by portraits of valedictorians from years past, which were now pushed to the side to create room for more kinds of distinction.

Over the past several years, 14 of the local districts have participated in a statewide "What's So Cool About Manufacturing?" student video contest. Hosted by the Manufacturers' Resource Center in Allentown, PA, in partnership with trade organizations and state and local workforce boards, the contest invites middle and high school students to visit a local manufacturer and produce a video that describes the appeal of careers in the industry. The videos the students created, with the support of their teachers, emphasized high-tech manufacturing jobs, the centrality of STEM, and opportunities for rewarding and challenging manufacturing careers at all degree levels. Schools then not only submitted the videos to the statewide contest, but also advertised them on their district web pages and social media feeds. Together, the videos show manufacturing's foundational role in high-tech industries ranging from healthcare to electronics to defense and space exploration.

In the way educators spoke about the importance of CTE, they sometimes made efforts to raise the status of sub-baccalaureate careers by arguing for their equivalence with white-collar jobs in terms of skill and importance to society. One school director asked me,

> Director: If you had to get a surgery, would you be okay with a surgeon who, in his experience, has been successful 50% of the time? How about 80%?
> Sarah: It would have to be 100%, or at least close.
> Director: What about a mechanic who's fixing your breaks? Would you be okay with someone who's effective 50% of the time?
> Sarah: No!
> Director: He's got your life in his hands too. But we have this mindset that it's a lower, menial job, but it's the same.

In this exchange, the school director explicitly challenged the pre-existing occupational hierarchy that positions automotive mechanics below surgeons. In other exchanges, the educators confronted the view that the trades in particular were for students who were less intelligent than college-going students. A precision machining instructor at a CTC explained to comprehensive high school teachers touring the building that the program is "challenging" and certainly "not a lesser pathway." Students needed to be able to read a micrometer and mentally add and subtract readings to the third decimal, as well as convert tools' surface feet per minute to revolutions per minute in order to set the machine. The stakes resting on the students' ability to perform these calculations correctly were high: if not set properly, the machines could burn through the tools' bits, which can cost $70 to $80 each. Though vocational classes may not use calculus or AP English Lit, the educators explained, they require and develop intelligence and agility. Educators challenged students to reconsider their stereotypes about the skills used in manufacturing and construction in particular: "You think of manufacturing, you think of this; you think of construction, you think of this. You see big trucks moving dirt around tractors. You don't understand that there's an engineering piece to this, and there's an electrical piece to this building. There's so much more to it."

In their efforts to raise the status of these careers, it seemed that, for some of the educators, defending their respectability reflected deeply rooted value systems. A meme that one career counselor enjoyed sharing with students and faculty encapsulated the values at stake in their defense of middle-skill occupations. The meme, shown in Figure 2, contrasts the postsecondary educational decisions of "Jim" and "Joe," two white men who went in vastly different directions after high school. Jim, the meme explains, pursued a BA in philosophy, a degree that the participants often referred to as the epitome of impracticality in the liberal arts. Although Jim took out $100,000 in student loans to obtain this degree, he has been unable to find a job that will use it. Despite his troubling debt-to-income ratio, he believes that because he holds a college degree, he is intellectually superior to those who do not. Joe, on the other hand, pursued a lineman apprenticeship. Instead of paying tuition, he earned a salary while training for his job, resulting in such high-demand skills that he now earns $80,000 per year. Although Jim may think that Joe is inferior to him, Joe sees through Jim's façade of competence, because it is he who disconnects the electricity when Jim cannot pay his bills.


Figure 2: "Jim vs. Joe" Meme (2019) Shared With Students and Faculty

Although the meme's text focuses primarily on the cost/benefit ratio of individual choices, the imagery suggests that Jim and Joe represent the competing statuses of differing social groups, as envisioned by the group that Joe represents. Jim, as he sips whiskey or bourbon with his man bun, thick-framed glasses, beard, and "College" sweatshirt, seems to signify the perceived snobbery of the highly educated. This group, the meme implies, looks down their noses at non-college-educated folks like Joe, even as they sit idly. In other words, the group Jim represents are the imagined would-be sophisticates, resented for their shameless cultural elitism. Joe, on the other hand, is clean-shaven, wearing work gloves and a hardhat, representing the industriousness of the working class. His labor is not only tangible, but also necessary to society, and his strong work ethic demonstrates the moral rectitude of blue-collar workers. Despite people like Jim looking down on people like Joe, the meme communicates, the working class quietly carries out their duties, knowing who is actually deserving of social recognition.

The meme also communicates the importance of earning one's way through strong individual work ethic and a commitment to following the opportunities that exist, being strategic about adapting to the needs of industry. As described earlier, a willingness to roll up one's sleeves and engage in physical labor is held in high esteem within the community, where even a subset of the educators took pride in their blue-collar experiences. According to a school counselor, "I like and respect salt-of-the-earth kind of people who know how to get after it and wanna hustle and wanna grind." At several schools, counselors or teachers distributed materials by Mike Rowe, best known as host of the show "Dirty Jobs" and founder of the mikeroweWORKS Foundation, which works to "close the skills gap by challenging the stigmas and stereotypes that discourage people from pursuing millions of available jobs … because our organization don't think a four-year degree is the best path for the most people … and we are

convinced that the solution has to start with a new appreciation for hard work" (MikeRoweWORKS, 2020).

By defending sub-baccalaureate careers in traditional vocational fields, educators were upholding this value system and the importance of teaching young people to develop skills that, above all, centered around this willingness to hustle. One assistant principal explained,

> I feel like, too often, we paint the future through these rose-colored lenses that everything's going to be great and it's going to be easy. Well, it's not going to be easy and that shouldn't be easy. If you want things, you have to be willing to make sacrifices to get there with anything, you do that with anything.

Far from putting students off traditional vocational training, the educators' emphasis on the respectability of hard work seemed to build enthusiasm among some students for taking CTE courses. Educators explained that many students, especially male students whom most teachers had often written off as not invested in learning, responded well to vocational teachers and the message that you do not have to be a straight-A student to be successful, if you are willing to show up and work hard. Enrollment in traditional vocational CTE had increased dramatically from just several years prior, and some courses such as welding had long waitlists. Also essential for increasing CTE enrollment was convincing parents of its value.

### *Overcoming Parent Skepticism by Emphasizing Choice*

When I asked if they felt their efforts to persuade parents to consider four-year college alternatives had been successful, many of the educators admitted that they had a hard time reaching many parents to communicate any information at all. Nonetheless, through their repeated efforts to engage parents – with parent nights, social media posts, newsletters, websites, and email listservs – the educators sent a consistent message about the importance of informed and intentional postsecondary planning, with college being one of multiple positive potential

pathways. According to one principal, "I think we're educating parents as much as we're educating the students on the possibilities." For some parents, this was a real shift in thinking, or what one counselor described as a "cultural shift." The idea of success being predicated on attending college was ingrained in the worldviews of many parents at all levels of education, and some educators described this mindset as the largest obstacle they faced to implementing career education. As such, the administrators and counselors described their information-sharing as a marketing project: "we're careful how we sell it," explained a counselor. They insisted to families that they were not directing students away from college, but rather, they were expanding the options available for students to explore if they chose to, depending on their personal interests and financial goals. A principal explained,

> Another reason that we're not getting pushback, and I don't anticipate that we will, is that the secret to implementing programs and making them work is that you don't do a one-size-fits-all. You don't force it upon everyone. So, what we're developing here are opportunities, and opportunities that are available to everyone but aren't forced onto everyone. That's key.

With this approach, his school and others experienced a largely positive parent reception to the career education focus. Educators thought that the ideas resonated especially with families who had personal experience with high student loans and degree inflation, because "in this community [there are] plenty of parents, siblings, cousins, whatever who are in that boat [of] being overqualified for what your job actually needs." One principal attributed the declining enrollment in Pennsylvania's state system of higher education to families' sense of declining returns to four-year degrees: "…because it's one of those cost-benefit analyses that the costs have risen and the benefits of going to a state school […] there isn't a payoff and there isn't a payoff for the families that really can't afford it." As such, many parents were grateful to learn that the schools shared their concerns and were working to provide alternatives, according to the

educators: “We talk to parents now, and we’re saying these are opportunities. Parents are saying, ‘Wow, I wish I had that when I was in high school. I wish his older brother had that when he was here,’ and things like that.” For the parents who had long questioned whether college was right for their kids, the schools’ messaging came as a relief, a superintendent explained,

> I had one parent tell me, “I was almost ashamed to tell my kid it was okay not to go to college and now you’ve given us the opportunity to say that and feel good about it, and now you’re providing our students with an opportunity to learn an employable skill that will set them up.”

By expanding their messaging around what counts as respectable postsecondary preparation, the districts allowed students and families to take pride in the non-traditional pathways that were once stigmatized, and many were grateful for this.

This is not to say that the schools faced no parent skepticism at all. One counselor described a parent concerned that the school’s addition of technical courses risked “dumbing down” the curriculum. The counselor’s response to the parent was that, even as the school created new opportunities for students to explore non-college career preparation, they were expanding their selection of AP classes for students who were college-bound. By emphasizing to parents that the goal was to expand the options available to students, not to shift resources away from traditional academics, he felt that he was successful at garnering support from parents who were initially skeptical: “…once they get it, they get it; they understand it, and they come on board.” Sometimes parents came around after directly witnessing the impacts of CTE on their children. One participant told of a mother who was initially skeptical when her son decided to pursue an apprenticeship instead of attending college, but she soon reported back to him with positive news:

> [She said,] “I couldn’t believe the money [the employer] started him at while he’s learning. He’s going to be the only one of my kids with no college debt.’ She was just, ‘As a parent, thank you for doing that. I’m so glad that [the apprenticeship

> coordinator] and [the workforce development intermediary] convinced me that this wasn't him settling or cutting himself short."

Even schools that served high-income student populations, where the school leadership had been most concerned about parent pushback, given the skepticism among their teachers, reported positive parent responses. An assistant principal at a high-income school described being surprised at their parents' warm reception to the school's new, more expansive approach to postsecondary preparation:

> We worried initially that if we share out to parents that college isn't the only form of success after high school that we were going to get big time backlash. Again, it's a community that probably 80% of the students go to college or enroll in college … But parents were super receptive … In the back-to-school night presentation, I shared with parents, "This is our vision, this is where we're headed. Don't grade hound your kids. Let's try to inspire passion. Let's try to find opportunities that make sense and that have future-focused opportunities for them." I came back to the office after I shared that with parents and told [the superintendent], "Get ready for the email barrage. It's coming." And it was just the opposite. There was a lot of parents saying thanks. "I have a kid that's in college now that isn't loving it, and it's reassuring to hear that there are opportunities."

With examples like this, the administrators and counselors described their marketing efforts as remarkably successful. Of course, educators likely heard primarily from the most vocal parents in their districts, whose views do not necessarily represent those of all district parents. Yet the educators' perceptions of parent support encouraged them to continue expanding and promoting vocational and technical career preparation.

**Chapter 4 Discussion**

To justify school investments into CTE and market these programs to students and their parents, education stakeholders in the Oaksburg region challenged occupational hierarchies that placed vocational learning in an inferior position relative to college-prep curricula. Unlike schools that reduce the stigma of CTE programs by drawing attention to "new era" (Malkus,

2019) course offerings and emphasizing their relevance for college and high-status careers (Malkus, 2019; Newman & Winston, 2016; Puckett & Gravel, 2020), Oaksburg school leaders challenged the status hierarchy that placed careers requiring a four-year degree above the sub-baccalaureate careers that their community depended upon. Supporting the Weberian notion that educational credentials function as boundary markers in order for status groups to monopolize access to rewarding careers (Weber, 1946b), the education stakeholders believed that measuring postsecondary success by BA attainment worked to exclude many of their students from high-status career options. They recognized that well-resourced students would invariably have the upper hand when competing for occupations with scarcity-based credential requirements as credential inflation drives degree thresholds ever-higher (Collins, 1979). In a local job market with such strong demand for middle-skill workers, pressing students to take on financial risk in order to compete for these credentials appeared to curtail more opportunities than it opened. Instead, educational stakeholders blurred boundaries of prestige between academic and CTE coursework by drawing attention to the potential for sub-baccalaureate occupations to garner decent financial rewards and high social status.

In addition to sharing information about substantial earnings overlaps between sub-baccalaureate careers and careers requiring BAs or advanced degrees, education stakeholders explained how sub-baccalaureate workers actively contribute to the social good. The auto mechanic stands between life and death, just as a doctor does, while the manufacturer stands between prosperity and stagnation and the lineman stands between power and blackout. All of these workers have learned a specific body of knowledge and set of skills; but unlike "Jim," the philosophy major, they learned a great deal of this knowledge through on-the-job experience, and this has made their social contributions all the more effective. For these reasons, the

educators explained, these occupations are as deserving of respect as those with higher credential requirements. By making a case for why sub-baccalaureate careers deserve high social honor, the education stakeholders upheld an occupational prestige hierarchy based on both social class and cultural conceptions of goodness, rather than income and education alone. In this way, their behaviors support the view that occupational prestige is multidimensional, consisting not only of objective socioeconomic positioning but also of culturally-bestowed honor (Abbott, 1981; Freeland & Hoey, 2018; Weber, 1946a).

In addition to having a personal stake in this type of multidimensional prestige hierarchy (after all, it places educators in a higher position than prestige hierarchies that are based solely on income and education), many of the school leaders took pride in their own blue-collar work experience or that of their family members, as has been mentioned earlier. Some drew on working-class cultural belief systems in which a strong work ethic signals moral worth. All of them, aside from those in the wealthiest districts, recognized their communities' disproportionate dependence upon and heightened respect for manufacturing and the trades. In turn, honoring these occupations garnered positive receptions among large segments of their districts' parents, building momentum for the traditional vocational fields of CTE that have little justification in schools that base the status of coursework on college relevance.

In some ways, school leaders shared Dewey's conviction that vocational projects serve as incubators of intellectual growth and knowledge integration through active learning. They emphasized that the hands-on application of theoretical concepts reflects and promotes high-level thinking, echoing Dewey's frustration with the dualism between theory and practice in the Western cultural psyche. Despite these similarities, the form of vocationalism that the Oaksburg educators envisioned and enacted was not the paragon of "learning through occupations" that

Dewey envisioned. Whereas Dewey dismissed specialized vocational training for a specific occupational niche as "absurd" (1923, p. 317), Oaksburg school leaders made efforts to provide students with intensive vocational coursework and pre-apprenticeships that led to industry certifications. They emphasized the importance of helping students to attain these credentials early, before they would be charged hefty tuition dollars to earn the same certifications in postsecondary institutions.

The efforts to elevate sub-baccalaureate career pathways may also have contributed to any pre-existing information gaps among students about college and careers. Education stakeholders aimed to help students think more intentionally and pragmatically about their postsecondary plans, discussing the risks of large student loans, the variation in returns to degrees by occupational field, and the demand for workers in well-paying middle-skill careers. But to illustrate these points, they used extreme examples, warning of student loans in excess of $100,000, showcasing welders who earned six figures, and comparing the highest-earning occupational certificates to the lowest-earning master's degrees. Given the low level of knowledge among many adolescents regarding college and careers (Meece et al., 2013), it is likely that a significant proportion of students took these exceptions to the rule as the norm. Economically disadvantaged students were particularly vulnerable to misinterpretation of the education stakeholders' messaging efforts. Low-income students tend to have less experience with and knowledge of higher education (Byun et al., 2012; Carr & Kefalas, 2010; Dynarski et al., 2018; Meece et al., 2013), meaning that the extreme examples that education stakeholders shared could have been some of the primary information that they received about postsecondary planning. In environments of selective or low college information, low-income students who are unsure whether they were "college material" or who doubt their competitiveness for selective

colleges develop lower college-going expectancies and motivations than their similarly-qualified peers (Dynarski et al., 2018). As a result, the Oaksburg education stakeholders' messaging had the potential to mislead the students most in need of accurate information about college and careers, undermining their ability to make postsecondary decisions that would support their personal goals.

Perhaps anticipating concerns about limiting students' ambitions for higher education, the administrators and counselors underscored that they were not necessarily discouraging students from attending college. Instead, they presented their schools' investments in vocational education and opportunities for exploring sub-baccalaureate careers as an expansion of existing opportunities that students could choose to partake in only if they were interested, while college-prep coursework remained abundant for students who wanted it. The principal who insisted that his school was offering "opportunities that are available to everyone but aren't forced onto everyone" encapsulated the view that offering CTE to help students prepare for in-demand sub-baccalaureate careers did not limit, but rather expanded their options. He and other school leaders recognized that a college-prep curriculum delayed students' access to specialized knowledge and technical skills that, if offered in high school, could save considerable trade school tuition dollars, prevent a number of four-year college dropouts, and expedite student transitions into well-paying middle-skill jobs (Newman & Winston, 2016; Shavit & Müller, 1998; Symonds et al., 2011). In this way, participants echoed Coleman's (1968) observation that the opportunities provided through vocational education are curtailed by a purely academic curriculum.

However, unlike Coleman, the participants were not concerned that it was impossible to know ahead of time whether an individual student would be more successful in a college or

vocational pathway. Whereas Coleman felt this dilemma was potentially irresolvable (1968, p. 9), school leaders believed that they avoided this dilemma by putting the onus on the student and their family to make decisions about the type of pathway that would best help the student to reach their postsecondary goals. Researchers and practitioners concerned about the potential for CTE to reproduce tracking may consider this stance a failure to uphold the school's responsibility to equal opportunity, since financially vulnerable students may assess sub-baccalaureate options more favorably regardless of their career interests and abilities. An expanded set of options available to all students could still reproduce social stratification if only a subset of students with heightened financial risk partakes in them.

The participants did not believe that tracking threatened equal opportunity, in part because they did not believe that vocational career pathways were inferior to exclusively academic pathways. Foundational to this belief was a strong local dependence on middle-skill workers in manufacturing, healthcare, and the trades, making these occupations' social contributions readily apparent. The predominance of manufacturing in particular meant that students pursuing sub-baccalaureate education in traditional vocational fields faced an occupational landscape with opportunities for middle-class careers, given the wage premium that manufacturing workers enjoy (Levinson, 2019). In this way, the Oaksburg region is exceptional in the United States, which has seen steep national declines in manufacturing and the well-paying jobs it once offered (Ramaswamy et al., 2017). However, the eagerness of the education stakeholders in Oaksburg to showcase and honor locally available middle-skill occupations speaks to the perceptions shared more broadly that the eroding social recognition of these careers should be restored, as BAs are increasingly questioned as the benchmark of class-based merit (Sandel, 2020). As polarization in earnings between those with and without BAs grows, a pattern

that has most dramatically reduced wages among men with low levels of education (Tuzemen, 2018), calls for investments in high-quality CTE and a reassessment of how different types of work and learning are valued will likely continue to grow. This chapter shows that the enactment of modern vocational education also depends on local processes of meaning-making about occupational status, as education stakeholders seek to define what "success" after high school really means. The following chapter will explore how students on the receiving end of educators' messaging and enactment of CTE have developed aspirations based on their own ideas of postsecondary success.

# CHAPTER 5: OAKSBURG HIGH SCHOOL STUDENT ASPIRATIONS AND VOCATIONAL DEVELOPMENT – COMPARING CTE TRADES CONCENTRATORS WITH COLLEGE-CONCENTRATOR AND NON-CONCENTRATOR PEERS

Emerging causal studies have found that, despite generally positive impacts on two-year college enrollment and attainment of industry-recognized certificates (Dougherty, 2016, 2018a; Theobald et al., 2019; Witzen, 2019), participation in modern CTE programs can decrease enrollment in four-year colleges (Brunner et al., 2019; Cowan et al., 2019; Dietrich et al., 2016; Dougherty, 2018a; National Center for Education Statistics, 2020a; Witzen, 2019), especially for traditional vocational fields including architecture and construction, manufacturing, and transportation (Giani, 2019). These findings challenge the college and career readiness ideals of CTE policy, which hold that CTE is distinguished from vocational education of the past in part because it does not detract from college preparation. In turn, some researchers have raised alarms about the potential for tracking between college-oriented and CTE students and between CTE courses that prepare students for four-year college coursework (e.g., STEM, computer science, engineering) and CTE courses that prepare students for sub-baccalaureate training (e.g., traditional vocational CTE, hospitality, human services; Hodge et al., 2020). However, as we saw in the previous two chapters, educators actually implementing CTE may have very different perspectives about the goals of CTE and its role in preparing students for college. In Oaksburg, where schools have invested heavily in traditional vocational CTE, many educators considered reduced enrollment in four-year colleges to be a feature, not a bug, of CTE coursework. They believed that, by capitalizing on local demand for middle-skill workers through expanded CTE, they could help to reduce college dropout rates and underemployment among BA holders in a state with some of the highest four-year college tuition in the nation. In turn, they argued that many students would jump at the chance to avoid pursuing a BA if they were sufficiently aware

of the opportunities that CTE and sub-baccalaureate training could provide. From this point of view, the reduced four-year college enrollment of CTE students observed nationally could indicate not unequal educational opportunity, but rather an expansion of opportunities beyond the college-or-bust mentality that so many students once internalized.

Currently, there is very little empirical evidence of CTE students' postsecondary preferences and decision-making processes, leaving open the question of how much reduced college-going among CTE graduates reflects structural obstacles versus personal preferences. A great deal of sociological literature assumes that pursuing sub-baccalaureate education – as opposed to a four-year degree – is invariably the result of receiving inadequate academic preparation, facing insurmountable financial hurdles, holding low levels of social and cultural capital, and/or floundering amidst labyrinthine policies and requirements at higher educational institutions (Bozick & DeLuca, 2011). According to this view, low college-going among CTE students would reflect a vocational education system that has failed to prepare students to overcome these structural constraints, instead acquiescing to the inevitability of unequal outcomes and preparing students for their next-best option. However, the education stakeholders I spoke with, as well as a number of CTE researchers and advocates (Newman & Winston, 2016; Rosenbaum et al., 2017; Symonds et al., 2011), argue that students may pursue sub-baccalaureate careers not as an alternative to their first-choice college goals, but instead because such degrees can prepare students for a range of rewarding, well-paying, and socially valuable careers that align with their personal interests and aspirations. These advocates of sub-baccalaureate education hold that elites' cultural biases against workers with lower levels of education contribute to overly narrow choice sets for students, in turn marginalizing youth who do not aspire to careers that require advanced levels of education. At the heart of this controversy are

differing assumptions about the constraints and preferences that shape student decision-making. Yet little work has examined how youth themselves think about their postsecondary options in the informational and cultural milieus shaped by family, school, peer group, and other community influences.

This chapter addresses this gap, interrogating the aspirations of students in traditional vocational CTE, compared to those of their non-CTE peers. To frame this analysis, I turn to the literature on adolescent vocational development, which offers a range of constructs for thinking about how students generate career goals in settings with varying forms of opportunities and constraints. Youth experiences within these settings shape the degree to which their career goals are developed, informed, and stable, indicating the level of student agency in the aspiration development process. After reviewing this literature, this chapter examines course-taking patterns, aspirations, and vocational development among students at OHS. Drawing on student administrative data and responses to a survey I administered on vocational development, I tease apart differences in vocational development among students with different levels of participation in CTE and college preparation activities. These comparisons are based on three groups: trades concentrators, who have invested substantial time in manufacturing and/or construction coursework; college concentrators, non-trades concentrators who have invested substantial time into preparing for four-year college; and non-concentrators, students who indicated little postsecondary preparation activity.

This analysis reveals that, consistent with the literature, trades concentrators had lower college aspirations than other students with similar demographic characteristics. They were also more likely to overestimate the median salaries of workers with educational credentials below a BA. These findings suggest that trades concentrators' lower educational aspirations were, in part,

based on inaccurate perceptions of their potential earnings in sub-baccalaureate careers. However, trades concentrators had strong vocational identity and self-reported knowledge about their chosen career fields, scoring higher than non-concentrators with similar background characteristics on these measures and as high as college concentrators. They also had better occupational alignment than college concentrators, reflecting that the levels of education they aspired to more accurately matched the education required to meet their career goals. Non-concentrators, on the other hand, had low educational aspirations and low vocational development. They were also more likely than CTE concentrators or college concentrators to be low-income and/or ethnic-minority students.

I discuss implications of these findings for sociological theory on youth educational aspirations, calling for a more expansive understanding of why some adolescents do not aspire to a BA. I argue that such sub-baccalaureate career goals in the context of CTE participation often coincide with well-developed vocational identities, rather than purely reflecting constraints on goal-setting. In turn, CTE students pursuing sub-baccalaureate education may do so with much of the knowledge, attitudes, and skills that predict positive long-term career outcomes, including career satisfaction and performance, employment stability, and higher wages (Anderson et al., 2016; Galvin et al., 2018; Honicke & Broadbent, 2016; Sabates et al., 2011; Staff et al., 2010). While I am not able to parse the extent to which differences in aspirations and vocational development between trades concentrators, non-concentrators, and college concentrators reflect selection effects versus the influence of participating in these programs over time, the presence of significant differences among ninth-grade students suggests that a great deal of the observed differences was due to student self-selection. This implies that trades concentrators had aspirations for careers that required lower levels of education than those of their college

concentrator peers before entering high school, and they selected programs of study that would support these goals. Students from the most socioeconomically and ethnically marginalized groups, on the other hand, had the lowest participation in extensive CTE coursework and other postsecondary preparation activities, as well as the lowest levels of vocational development. These non-concentrators appear to have started high school with lower aspirations and vocational development than their peers, and their relatively low participation in CTE and college-prep activities likely exacerbated these differences. In turn, they are likely to face a number of barriers along their future educational and career pathways.

## Youth Postsecondary Aspirations

### *Rethinking Assumptions About Why Youth Goals Vary*

Given CTE's mixed impacts on postsecondary outcomes, it is not obvious how youth and their families perceive the options provided by CTE or how they make decisions about whether to participate. As Bozick and DeLuca (2011) point out, following years of research on tracking and inequality, most sociology of education research assumes that all youth aim to attain a four-year college degree. When youth do not achieve this ideal, researchers generally attribute the cause to a combination of academic, economic, informational, and institutional roadblocks. When sociologists document youth goal-setting that deviates from the pursuit of higher education, these deviations are commonly viewed as strategies to optimize outcomes in light of constraints (Grusky, 2015). For example, DeLuca, Clampet-Lundquist, and Edin (2016) described the desire for "expedited adulthood" among disadvantaged youth in Baltimore who sought careers that would bypass a four-year college degree. The authors attributed this desire to constraints of poverty and confusing institutional structures that made earning an immediate income seem less financially risky than investing in the pursuit of a BA. Similarly, Breen and

Goldthorpe (1997) considered self-exclusion from higher education through anti-intellectualism within working-class culture to be a cultural adaptation to the increased financial vulnerability working-class families face when investing in college, as attaining a degree is far from guaranteed. Researchers in the field of education often make similar assumptions, framing aspirations other than a four-year degree as a problem to be solved via intervention. Youth and their families are generally assumed within these literatures to develop goals and cultural practices that help them achieve the highest level of education and income deemed possible, given the obstacles they face.

This generally unquestioned assumption that the end goal of participating in the education system is the same for all youth stems from the organizing norm of upward mobility, classically theorized as contest mobility (Turner, 1960). In the United States, the role of the school has been translated as protecting equal opportunity to compete in a winner-takes-all competition for a limited number of valued social positions. By this logic, the desire to prepare for a sub-baccalaureate career through CTE would be considered an adaptation in the face of many structural constraints that make attaining a four-year degree unrealistic or uncertain. Yet stopping here, reducing variation in youth's goals and behavior to reflections of their structural positions, contrasts with a large body of sociological theory on how individual and cultural practices not only mirror social structure, but also help interpret it in ways that can both reproduce and subvert existing hierarchies.

As we saw in Chapter 4, culture-specific ideals of the social good help to determine which occupations individuals consider to be worthy of status and honor, and these categorizations may conflict with the structural hierarchy of occupations based on education and income (Abbott, 1981; Freeland & Hoey, 2018; Weber, 1946a). These ideals of occupational

status based on contributions to the social good may factor into student decision-making about career and education aspirations. The educators of Oaksburg certainly seemed to believe that this was the case. As described in the previous chapter, they encouraged their students to consider sub-baccalaureate career pathways in part by valorizing the work ethic required of such careers and their tangible contributions to society. For some rural youth, the reassurance that they can find respected careers in their local communities without needing to pursue a BA may provide resolution to the common conflict between connectedness to the family and home community and the need to leave both behind for the pursuit of a narrow ideal of career success (Agger et al., 2018; Freeman, 2004; Friesen & Purc-Stephenson, 2016; Schafft, 2016). Indeed, Bozick and DeLuca (2011) discovered widespread sub-baccalaureate aspirations among students who perceived there to be desirable local job opportunities that did not require college degrees. This group, whom they termed "work-driven non-enrollees," was composed of mostly white, male students who faced neither economic nor academic constraints on enrolling in college.

### *The Stakes of Understanding Youth Goal-Setting*

Developing an accurate portrayal of adolescents' postsecondary aspirations and the preferences and constraints that inform them has important implications for the interventions educators and policymakers make to improve educational opportunity. According to credentialing theorists, creating avenues for youth to pursue a more expansive set of aspirations would help to temper the socially reproductive consequences of degree inflation. Good-faith efforts to expand four-year college access may actually have the contradictory effect of legitimizing social inequality by upholding standards of merit based on degree thresholds that are ever-rising, thereby maintaining well-resourced groups' privileged access to desirable positions in the structural hierarchy of careers (Bourdieu, 1984, 1986; Collins, 1979; Weber, 1946a).

Technical training for a wide variety well-paying jobs, on the other hand, helps undermine the winner-takes-all nature of credentialist education systems. If employers are involved in helping youth develop skillsets closely aligned to a variety of industry needs, young people can accumulate tangible and trustworthy forms of human capital that are valued on the labor market for their use-value rather than their scarcity (Caplan, 2018; Hansen, 2011; Labaree, 1997). Widespread, high-quality vocational training for socially respected careers would theoretically put the brakes on the growing economic and social polarization between those with and without cultural capital, disguised as merit, in the form of exclusive degrees (Sandel, 2020).

At the same time, a reevaluation of the overly narrow BA ideal does not imply adolescent sub-baccalaureate goals should be accepted at face value, validated and supported no matter what. That academic, economic, informational, and institutional obstacles disproportionately impact low-income and racial/ethnic minority students and dampen their educational ambitions has been well-documented (see Brock, 2010; Keels, 2013 for reviews). Students facing such obstacles may develop overly modest ambitions due to the barriers that interfere with informed goal-setting. CTE could disguise these low aspirations as personal choice, distracting from the need to dismantle these systemic inequalities. Although CTE is designed to increase the information that students have about the world of work, it may also reduce access to information about applying to and navigating the process of completing advanced higher education if CTE participation limits students' time in college-prep coursework and segregates them from their more college-oriented peers. A thorough understanding of how CTE influences student postsecondary decision-making should consider the extent to which CTE supports goal-setting that is informed, realistic, and ambitious. For this, we may turn to the literature on adolescent vocational development, which takes into account the ways in which individual, family, school,

and community factors, including contexts of vocational learning, influence adolescent development of and commitment to career goals. By examining specific measures of students' vocational development and the ways in which CTE shapes these processes, we can draw conclusions about the extent to which CTE students' aspirations – including aspirations for sub-baccalaureate degrees – reflect opportunities to pursue their ideal career outcomes, versus insurmountable constraints on this pursuit.

### *Measuring Vocational Development: Career Maturity, Vocational Identity, and Occupational Alignment*

Two fundamental concepts in the literature on adolescent vocational development are career maturity and vocational identity. According to Super (1955), the development of career maturity, or readiness to make age-appropriate educational and occupational choices, is a central outcome of vocational exploration and aspiration construction (see also Crites, 1973; Savickas, 1984). At the adolescent stage, career maturity is based in knowledge about oneself, knowledge about occupations, and the attitudes and skills that help the individual to integrate these two domains (Langley et al., 1996). The construct is composed of both cognitive and affective dimensions, with the cognitive reflecting decision-making based on information about the world of work and the affective reflecting individual attitudes toward making career decisions (Crites, 1973). Only modestly correlated with socioeconomic status, career maturity can be enhanced through education and vocational experiences (Crites, 1973). Vocational identity, or the clarity and stability of one's goals, interests, and abilities (Holland, Johnston, & Asama, 1993), is related to career maturity in that it becomes stronger following exploration of career options (Turner et al., 2006).

Youth who score higher in career maturity and vocational identity development tend to have higher self-efficacy and internal locus of control (Brown, 1999; Coertse & Schepers, 2004; Savickas, 1993) and can thus be expected to have better long-term outcomes across a broad number of domains, including academic achievement, career satisfaction and performance, health behaviors, and civic involvement (see reviews by Anderson et al., 2016; Galvin et al., 2018; Honicke & Broadbent, 2016). Youth with low vocational identity, on the other hand, have been found to experience lower educational attainment, more employment instability, and lower long-term wages (Sabates et al., 2011; Staff et al., 2010).

A useful measure of how vocational identity and career maturity intersect is occupational alignment, or the extent to which education and career goals are aligned (Schneider & Stevenson, 1999). For occupational alignment to take place, youth must have developed both a career goal and knowledge about how to achieve it (in other words, both a strong vocational identity and an adequate level of career maturity). Occupational alignment is thought to guide decision-making and behaviors that support long-term goal achievement (Schneider & Stevenson, 1999). When youth have misaligned ambitions, they are more likely in the long-term to experience employment instability and unfulfilled career goals (Croll, 2008; Rennison et al., 2005; Sabates et al., 2011). Youth who underestimate the level of education they will need to achieve their desired careers have been found to have substantially lower educational attainment and long-term wages than their peers with more accurate expectations of the education their career goals will require (Sabates et al., 2011). However, among youth with misaligned ambitions, it is most often the case that they overestimate the level of education they will need for their desired career (Meece et al., 2013; Schneider & Stevenson, 1999). While the impacts of over-aligned ambitions are not as great as those of under-aligned ambitions, men with over-aligned ambitions have been

found to earn lower wages, while women with over-aligned ambitions have been found to have lower educational attainment, on average (Sabates et al., 2011). It is unclear exactly why over-alignment can lead to negative outcomes. Schneider and Stevenson (1999) suggest that over-alignment can result in school dropout once students realize that they will likely not need the level of education they are pursuing. It may also be the case that over-alignment reflects limited career knowledge more broadly.

In an ideal world, youth would feel that they have agency in their career trajectories, and this feeling would be based on accurate information about what it will take to achieve their goals, including educational requirements and other steps necessary to gain entry into an occupational field. In reality, all youth make decisions in environments of partial and selective information, and they vary in their commitments to particular interests and goals. But some youth have access to more information and have developed greater clarity of their strengths and interests than others, theoretically leading to a greater capacity for self-direction and preparation for overcoming barriers in pursuing paths that will lead to the outcomes they envision. Strong vocational development indicates that youth have had ample opportunities to explore accurate information about careers as well as their personal interests and goals, and that they have come to a working plan about how they will match these domains. A range of environmental influences shape student access to these exploration opportunities and informational resources, as the next section will detail.

### *Contexts of Aspirations: Access and Barriers to Strong Vocational Development*

During the process of vocational development, youth participate concurrently in family, school, and community settings that may all exert varying degrees of influence on youth experiences, information, and goals (Bronfenbrenner, 2001; Stone & Mortimer, 1998). A great

deal of scholarly literature has focused on the ways in which these settings both confer opportunities and create constraints that shape the way youth progress through vocational development (Schneider & Cook, 2015; Young, 1983; Zimmer-Gembeck & Mortimer, 2006). For example, one of the greatest predictors of youth motivation to complete a BA is parent expectations for college completion (Kahl, 1953; Meece et al., 2014; Oymak, 2018; Sewell et al., 1969). In his study of working-class boys' college aspirations, Kahl (1953) found that the boys aspired to higher levels of education when their parents were dissatisfied with their own working-class jobs and aspired to middle-class ideals of upward mobility. When working-class parents had few middle-class social contacts and were satisfied with their own lifestyles, they tended to value job stability over mobility and their sons were unlikely to develop college ambitions. By shaping adolescents' postsecondary aspirations, parent expectations also influence occupational alignment. Youth who perceive high parent college expectations are more likely to overestimate the level of education required for their career goals (Meece et al., 2013; Schneider & Stevenson, 1999). Oaksburg educators expressed awareness of the strong influence of caregiver expectations on student goals and occupational alignment, targeting parents specifically in their efforts to promote CTE and sub-baccalaureate career pathways.

Influential contexts may also include labor market environment and geographical location. Changes in the organization of work create constraints and opportunities that shape the topography of the "labor opportunity structure" through which generational cohorts progress (Abbott, 2005). Geography may influence vocational development by making it more or less likely that information about the labor opportunity structure will be available to youth, promoting or impeding career awareness in general or awareness about certain types of careers in particular (King & Madsen, 2007; Munyi, Ma, & Yeh, 2011). For example, the impressions youth receive

about local economic opportunities play a major role in their educational goal development. Among youth residing in rural areas and small towns, such as those who attend OHS, those who hold positive views of local economic opportunity tend to have lower aspirations for postsecondary education and for occupations that require postsecondary education (Bozick & DeLuca, 2011; Meece et al., 2013). At the same time, they are more likely to underestimate how much education they will need to attain their desired jobs (Meece et al., 2013). Additionally, rural students may be encouraged by their parents to consider trade school or local work opportunities, which are less likely to lead to higher levels of education (Carr & Kefalas, 2010; Meece et al., 2013). Thus, youths' experiences in family and community contexts shape both career maturity, in terms of exposure to and accurate knowledge about college and careers, and vocational identity, in terms of the options, out of all possible careers, to which they give serious consideration.

Within these contexts, demographic differences between students can have major implications for their pursuit of various educational and occupational credentials. Socioeconomic status has been studied as one of the most important predictors of postsecondary goals. Youths' perceptions of limited family income tend to reduce postsecondary aspirations (Meece et al., 2013). Low-income students, on average, have less experience with and knowledge of higher education than their higher-income peers (Byun et al., 2012; Carr & Kefalas, 2010; Dynarski et al., 2018; Meece et al., 2013). They also tend to leave the education system and begin working earlier than higher-income youth, in part because they may lack the economic and social supports necessary for the extended career exploration that has become common in the "emerging adulthood" stage of the early and mid-twenties (Arnett, 2004; DeLuca et al., 2016; Furstenberg et al., 2004; Hendry & Kloep, 2007; Hogan, 1981; Silva, 2012)

In rural areas, being low-income compounds the likelihood that students will have low college expectations, in part because geographic isolation from universities contributes to lower levels of knowledge about college admissions and financial aid (Carr & Kefalas, 2010; Dynarski et al., 2018; Meece et al., 2013). For low-income students, this lack of information contributes to the development of low educational expectations compared to higher-income students with similar qualifications (Dynarski et al., 2018). Youth who perceive their families as experiencing economic hardship are also more likely to have under-aligned educational ambitions (Meece et al., 2013), meaning that they are less likely to understand the extent of the education needed for their career goals.

It is also important to note that racial minority, female, and economically disadvantaged students earn less with a BA than their white, male, and higher-income counterparts (Flores, 2016; Goldin & Katz, 2009). Sub-baccalaureate options such as occupational credentials and two-year degrees have been praised as contributing less to the reproduction of some inequalities. For example, students from low-income households with occupational certificates and associate's degrees have similar earnings and employment outcomes to students from high-income households with the same credentials (Rosenbaum et al., 2017). However, other studies show that pursuing sub-baccalaureate credentials instead of BAs could exacerbate inequalities for some types of students. Although college-educated women earn less than college-educated men, the gap between men and women with sub-baccalaureate credentials is, on average, even greater than the gender gap for those with BAs (DiPrete & Buchmann, 2006). Indeed, Sutton, Bosky, and Müller (2016) found that in communities with more sub-baccalaureate jobs, schools offered more trade courses and fewer college-prep courses, and female students had much lower employment and wages after graduating as a result. Pursuing sub-baccalaureate options also may

reproduce inequalities for students of color. In her study of blue-collar job networks, Royster (2003) found that when young Black and white men had equal blue-collar training qualifications, the Black men were less likely to find employment due to anti-Black racism and exclusion from job networks. Perhaps it is unsurprising, then, that female students and students of color on average report higher postsecondary educational aspirations than male and white students (Chenoweth & Galliher, 2004; Elder & Conger, 2000; Meece et al., 2013). At the same time, some ethnic minority students, including Asian American and Latino youth, have been found to score lower on measures of vocational identity (Boyd et al., 2003; Lucas & Berkel, 2005; Morales, 1996). Lucas and Berkel (2005) suggest that this may be due to a higher prevalence of cultural expectations that youth will incorporate their families' goals and values as well as their own into their career choices. For students at OHS, about one in five of whom identify as an ethnic or racial minority, these structural and cultural factors may influence the way participation in CTE or college-prep coursework shapes their vocational development.

School contexts can exacerbate pre-existing differences in career maturity and vocational identity across demographic groups. For example, within-school tracking historically has reified segregation of students by class and ethnic background. In turn, tracks could reinforce pre-existing gaps in college aspirations and information between high- and low-income students (Dynarski et al., 2018; Meece et al., 2013). Reducing low-income vocational students' access to higher-income peers with more knowledge about college and careers may reduce students' own aspirations for college (Hoxby & Avery, 2012). Vocational tracking in rural schools, therefore, may be especially likely to exacerbate marginalized students' low postsecondary expectations and information, contributing to lower educational attainment and employment instability (Holland & DeLuca, 2016; Sabates et al., 2011). In this way, participation in CTE coursework

could constrain student agency in making postsecondary plans. At the same time, vocational courses may provide important information about sub-baccalaureate training and careers that students would not receive otherwise. Deil-Amen and DeLuca (2010) found that students with extensive involvement in neither college-prep courses nor vocational courses had much lower college and occupational preparation than their college- or career-oriented peers. This "educational underclass," who were disproportionately from marginalized groups, were the most likely to never enroll in postsecondary training, to take remedial courses in community college if they did enroll, and to attain less lucrative jobs than their peers in college-prep or CTE coursework. By providing opportunities for career exploration to these students who otherwise would have low involvement in postsecondary preparation activities, CTE could dramatically expand student information and agency. For these reasons, it is important to examine how rural CTE students develop vocational goals compared to both their college-oriented peers and their peers with neither extensive college nor career preparation.

**Implications for Practice and Theory**

The stakes of comprehensively understanding the intersecting forces that culminate in students' postsecondary decisions are high. Ideally, youth would be able to make important educational and vocational choices in an intentional way, supported by adequate knowledge about their options and feelings of agency and self-efficacy. Postsecondary decisions based on knowledge, agency, and self-efficacy predict better long-term outcomes across a broad variety of domains, including education and work (Anderson et al., 2016; Galvin et al., 2018; Honicke & Broadbent, 2016). However, making such supports relevant and effective first requires a deep understanding of youths' own ideals of success, the information (accurate or inaccurate) that shapes their perceptions of various educational and career options, and the contextual factors that

influence the perceptions they construct and the information they receive as they make these decisions. If youth indeed overwhelmingly strive to attain a BA and the status it affords in the structural hierarchy of occupations, and if they pursue alternatives only when they feel this goal is unrealistic due to economic constraints, low academic preparation, or inaccurate knowledge, then one could argue that the significant resources necessary for making CTE high in quality would be better invested in addressing the obstacles that prevent students from successfully completing their paths to and through four-year colleges. On the other hand, if youths' ambitions and ideals of success vary in ways unexpected by structuralist accounts of educational ambition, and if this variation is based on an informed understanding of all the options they have available to them, then holding all youth to the same target would likely be detrimental to those who seek support for options outside the BA pathway (Bozick & DeLuca, 2011; Newman & Winston, 2016).

The analyses described in this chapter tease apart multiple influences on student postsecondary aspirations, including CTE participation and its relationship to postsecondary information, occupational alignment, and vocational identity. In turn, the results provide important context for policymakers and practitioners as they interpret the meaning of CTE concentrators' lower college expectations relative to those of their peers as a problem to be addressed or a signal of expanded ideals about postsecondary success to be supported, depending on the opportunities and barriers shaping youth aspirations. Simultaneously, these results give rise to a sociological reconsideration of how youth aspirations for education and work not only reflect but may also challenge pre-existing structural hierarchies in contexts of broader economic and social shifts. Specifically, youth who aspire to careers requiring relatively low levels of education, not because they deem higher education unrealistic, but instead because their career

goals do not take into account prestige based on educational level, challenge traditional notions about the extent to which structural hierarchies determine youth action. Analyses respond to the following research questions.

**Research Questions**

1. How evenly are various student subgroups represented among college concentrators, trades concentrators, and non-concentrators?
    a. How evenly are students with differing grade levels, genders, and racial/ethnic identities represented among non-concentrators, trades concentrators, and non-concentrators?
    b. How evenly are students with varying levels of parent education and different eligibility for free/reduced-price lunch (FRPL) represented among non-concentrators, trades concentrators, and non-concentrators?
    c. How evenly are students with low, average, and high academic achievement and with varying levels of school valuing represented among non-concentrators, trades concentrators, and non-concentrators?

2. How do trades concentrators compare to college concentrators and non-concentrators in terms of aspirations (educational aspirations, career aspirations), controlling for student sex, FRPL status, parent education, grade level, race, parent college-expectations, and grade point average (GPA)?

3. How do trades concentrators compare to college concentrators and non-concentrators in terms of vocational development (vocational identity, career maturity measured by career knowledge, salary estimates, occupational alignment), controlling for student sex, FRPL status, parent education, grade level, race, parent college-expectations, and GPA?

**Methods**

The findings in this chapter are based on analyses of OHS student administrative records containing cumulative GPA, course-taking history, gender, and FRPL status, as well as responses to a survey administered to students in the fall of 2019. All OHS students (n=1,200) were invited to participate in the survey, which they accessed electronically via iPads (provided by the district) during a 45-minute block of time at the end of the school day. The survey assessed student course-taking and credentialing plans, education and career aspirations, career maturity, vocational identity, parent expectations for college, and school valuing. Additional items

assessed further contextual influences on student aspirations, some of which were used to reduce bias when imputing missing data and some of which were not analyzed for this chapter. An overview of the measures is included below, and the full survey can be viewed in Appendix C. Student survey responses were linked to administrative records using student ID if students provided permission.

### *Measures*

**Trades concentrator.** Transcript data was used to determine the number of CTE courses students had taken in manufacturing or construction, as well as the students' plans for additional course-taking. In accordance with national and state-level definitions at the time of the study, "trades concentrators" were defined as students who had taken three or more CTE courses in either the manufacturing or construction sequence or underclassmen who had taken two or more courses in manufacturing or construction, with plans to take at least one additional course in the sequence (n=135).

**College concentrator.** College concentrators included non-CTE concentrator students who took steps to prepare for college after high school. This measure was based on student survey responses to questions about college planning (items 26a, b, & c); college help-seeking (items 19e, f, g, h, & i); number of honors courses planned to be completed by the end of high school (item 9e); the number of dual-enrollment, AP, or CHS courses planned to be completed by the end of high school (item 9f); plans to or experience of receiving SAT or ACT tutoring (items 13d, e, & f); and educational aspirations (item 30). The responses for these items were standardized and combined to construct a unidimensional college concentrator scale ($\alpha$ =.80). College concentrators were defined as students with scores in the top third of the college concentrator scale who were not trades concentrators (n= 323).

**Non-concentrator.** Non-concentrators were defined as students who were neither trades concentrators nor college concentrators (n=463).

**Parent education.** Students were asked to share the education level of each parent who they live with or visit on a regular basis (item 39). Six response options ranged from "Did not finish high school" to "Graduate degree" (e.g., MA, MD, PhD, JD). An additional response category allowed students to select "Don't know."

**Racial/ethnic identity.** Students were asked to check which racial/ethnic group(s) they identify with from among the following: American Indian, Asian American, Black or African American, Hispanic or Latinx, White, Other (write-in option).

**Aspirations.** Items to ascertain students' postsecondary goals (items 30 & 36) were adapted from the "Rural High School Aspirations" (RHSA) study developed by the National Research Center on Rural Education Support (Petrin et al., 2011). Educational goals were measured by asking, "How far in school would you most like to go?" (with seven response options, ranging from "Less than high school graduation" to "Earn an advanced degree [Master's, MD, PhD, JD, or other]" and a "Don't know" category). Student response options were then collapsed into three categories (high school or lower, sub-baccalaureate credential, and bachelor's or advanced degree) to create the educational aspirations variable. Career goals were ascertained by having students write open-ended responses to the question, "What type of job or career do you think you would MOST like to have at age 30?" Following Meece and colleagues (2013), each student's occupational response was coded by research assistants into one of five job zones according to the Occupational Information Network (O*NET) categorization of educational preparation required (ranging from less than high school/high school diploma to advanced/professional degree).

**Career maturity.** Aspects of career maturity, a construct referring to a student's readiness for making career decisions that are informed and age-appropriate as they progress through stages of career development (Savickas, 1984), were measured with a combination of items. Items to measure the cognitive domain of career maturity (in other words, how much information students were operating with) were assessed by examining how aligned students' educational and occupational aspirations were through the occupational alignment measure. Additionally, items assessed how much knowledge students had about the median salary for various education degree levels using the education level salary estimates measure. Both of these measures are described below. Items to assess the affective domain of career maturity (attitudes toward making career-related decisions) asked students to self-report how informed they felt about the career they most aspired to, and these items were combined into the self-reported career knowledge measure as described below. While these items do not comprise a comprehensive measure of career maturity, they do provide information about important aspects of student preparedness to make career-related decisions.

***Occupational alignment.*** This measure, adopted from Meece colleagues (2013), reflects alignment in the student responses to the previous questions asking about their educational and occupational aspirations. Student responses to the question about educational goals were collapsed into the same five groups used to code occupational aspiration job zones. Alignment was then measured by subtracting the occupational job zone for each student's desired occupation from their educational goal category. Occupational alignment scores took one of seven values ranging from -4 to 4, with negative scores reflecting under-aligned aspirations (underestimation of education required for occupational goal), positive scores reflecting over-

aligned aspirations (overestimation of education required for occupational goal), and scores of 0 reflecting aligned aspirations.

***Education level salary estimates.*** Item 23 asked students to select the typical salary of a person with a high school diploma/GED, associate degree, BA, and advanced degree, with nine response options ranging from $20,000 to $100,000 for each degree level. Scores on this item were calculated by subtracting the salary the respondent selected for each education level from the actual 2018 salary according to the U.S. Department of Labor and Statistics Current Population Survey (Torpey, 2018). Scores for each education level ranged from -70 to 60, with scores closer to 0 reflecting more accurate knowledge of typical returns to each degree. Responses were then standardized and combined into a univariate education level salary estimates scale (alpha=.78).

***Self-reported career knowledge.*** Four items (listed within item 38) asked students to rate their subjective feelings about the extent of their own knowledge regarding the activities, skills, promotion opportunities, and working conditions of the career they would most like to have at age 30. These items were adapted from the "Career Development Inventory – Australian – Short," a survey measuring career maturity, developed and validated by Creed and Patton (2004). For each item, students responded to a 5-point Likert scale ranging from "I hardly know anything about this" to "I know a great deal about this." Responses from these items were standardized and combined to construct a unidimensional career knowledge scale ($\alpha$ =.90).

**Vocational identity.** Vocational identity (21, 22) was measured with items adapted from the Holland, Gottfredson, and Power (1980) "My Vocational Situation" (MVS) scale. The MVS uses 18 true or false items to measure the clarity and stability of students' career goals and interests. The same items were included on the survey, but true-false response categories were

replaced with a 4-point Likert scale ranging from "Completely True" to "Completely False" to create more nuanced response options. The responses were then standardized and combined to construct a unidimensional vocational identity scale (α =.91).

**Parent college expectations.** This item (item 7) assessed student perceptions of their parents' expectations that they would attend a four-year college. Students were asked to indicate on a 6-point sliding scale (ranging from "Unhappy/Very disappointed" to "Happy/Not at all disappointed") their response to the following question: "How do you think your parent(s) or guardian(s) would feel if you didn't graduate from a four-year college?"

**School valuing.** Items to assess how strongly students valued school (7 items, listed under question 4) were adapted from the RHSA. Responses to each question were then standardized and combined to construct a unidimensional school valuing scale (α=.87).

**Additional items.** Additional survey items asked about the contexts of student vocational development. While not all of these were included in analyses, the following were used as auxiliary variables to reduce bias during missing data imputation.

***General social survey (GSS) socioeconomic index score.*** Students were asked to write in the occupation of up to two parents/guardians they live with or see on a regular basis (item 42). The occupations were then coded by research assistants, according to the 2010 census occupation classifications. These classifications were linked to their corresponding socioeconomic index score according to the 2012 general social survey (Smith & Son, 2014). These scores reflect the percentage of those in each occupation who earn $45,000 or more annually and the percentage of those in each occupation who have some college education or more.

***Subjective family finance score.*** Students were asked to rate their family's financial situation as one of the following: "Lives comfortably," "Meets needs with a little left," "Just

meets basic expenses," or "Often not enough to meet basic expenses" (item 46). This item was borrowed from the RHSA.

***Barriers.*** Students were asked to identify from a list of barriers which ones they faced while pursuing their ideal level of education. One of these items, "Need to help support family," (item 34, seventh response option) was included as an auxiliary variable.

***ACT/SAT tutoring.*** Students were asked to identify whether any of the following were true (item 13, fourth-sixth response options): "I have participated in SAT prep or ACT tutoring in the past," "I currently participate in SAT prep or ACT tutoring," "I plan to participate in SAT prep or ACT tutoring in the future," or, "None of the above."

### *Access*

Parents and guardians were informed of the study by school officials and had the option to decline their child's participation. Students taking the survey provided electronic consent for their survey responses to be used in the study and linked to their education records. In exchange for providing access to their student records, the school requested that I share survey findings with the school, conduct survey analyses on student responses according to grade level and FRPL status, and present analyses to administrators. I met these commitments in the 2 months following survey administration. All recruitment and study procedures were approved by the University of Chicago Social and Behavioral Sciences IRB.

### *Comparing Survey Respondents to the OHS Student Body*

Overall, 1,050 of the 1,191 students who attended OHS participated in the survey, for a response rate of 88.2%, as shown in Table 1. Comparing survey respondents to the broader student body using school administrative records helped to determine whether data missing due to survey non-participation were missing at random (MAR) or missing not at random (MNAR).

Data is said to be MAR when missing data is overrepresented for some of the observed groups in the study, but the reason for missingness is not related to the information that is missing. Data is MNAR, on the other hand, when the reason for an overrepresentation of missing data in an observed group is related to the missing information. For example, if male students were to be underrepresented among survey respondents specifically because they were more likely to be attending the regional CTC at the time the survey was delivered, data would be MNAR since we assume students at the center will have different outcomes on vocational development and aspirations. If data is MNAR, our estimates of these outcomes will be biased.

OHS administrative records provide information about student grade level, gender, GPA, and eligibility for FRPL. Most survey responses were linked to student administrative records, allowing for a comparison of survey respondents and non-respondents across grade level, sex, and eligibility for FRPL. However, a subset of students who completed the survey (n=212) did not provide consent to link survey responses to their administrative records. For these students, self-reports of grade level and gender can inform comparisons to non-respondents, but FRPL status and GPA are unknown.

Grade 12 students were underrepresented (Chi2: $p<.001$) and female students were slightly overrepresented (t-test: $p<.05$) in the survey sample in comparison with the OHS population, as displayed in Table 5. Respondents with known status as survey-takers also had higher GPAs (t-test: $p<.001$) than the OHS student population. This could indicate that survey-takers were higher-achieving, or it could be that higher-achieving students were more likely to provide permission to link survey data with their administrative records. The survey respondents were not significantly different from the overall OHS population in terms of FRPL eligibility (Chi2: $p>.10$).

Table 5: Comparison of Survey Respondents and the OHS Student Body

| | OHS Student Body | | Survey Respondents | |
|---|---|---|---|---|
| | N | % | N | % |
| **Total** | 1,191 | 100.0 | 1,046 | 100.0 |
| | | | | |
| **Free/reduced-price lunch** | | | | |
| No | 778 | 65.3 | 543 | 51.6 |
| Yes | 413 | 34.7 | 295 | 27.8 |
| Missing | 0 | 0.0 | 212 | 20.3 |
| | | | | |
| **Grade level** | | | | |
| 9 | 290 | 24.4 | 260 | 24.9 |
| 10 | 320 | 26.9 | 299 | 28.6 |
| 11 | 300 | 25.2 | 269 | 25.7 |
| 12 | 281 | 23.6 | 195 | 18.6 |
| Missing | 0 | 0.0 | 23 | 2.2 |
| | | | | |
| **Gender** | | | | |
| Female | 566 | 47.5 | 498 | 47.6 |
| Male | 625 | 52.5 | 494 | 47.2 |
| Missing | 0 | 0.0 | 54 | 5.2 |
| | | | | |
| **GPA** | | | | |
| GPA < 2.0 | 150 | 12.6 | 84 | 8.0 |
| GPA between 2.0 and 2.9 | 354 | 29.7 | 228 | 21.8 |
| GPA between 3.0 and 3.9 | 456 | 38.3 | 338 | 32.3 |
| GPA between 4.0 and 5 | 231 | 19.4 | 184 | 17.6 |
| Missing | 0 | 0.0 | 212 | 20.3 |

It is unlikely that the reason male students and lower-achieving students had lower survey participation rates (and/or rates of providing data-linking permission) is related to their outcomes for vocational development and postsecondary aspirations. However, the relatively low proportion of grade 12 students likely reflects the school policy that allows some seniors to leave

early in the school day, meaning they were absent at the time the survey was administered. To be eligible for early leave, seniors must maintain sufficiently high GPAs and attendance rates. If students with high GPAs and attendance have different postsecondary aspirations than other students, this could mean that our data is MNAR. The survey participants in grade 12 who provided data-linking permission had higher GPAs than non-participants, but the gap was half that of other grade levels. This suggests that grade 12 survey-takers were lower-achieving than other students. In turn, the findings may be biased, as estimates related to aspirations and vocational development may be influenced by an underrepresentation of high-achieving seniors.

### *Missing Data Imputation*

Among the survey respondents, there is a great deal of missing data for both select survey items and administrative data. In addition, not all students provided permission for survey responses to be linked to administrative records. Therefore, FRPL status, trades concentrator status, and GPA are unknown for about a fifth of the survey respondents. Additionally, some individual survey items, such as parent education levels, had high rates of non-response (17.9% for parent education). These missing data prevent meaningful comparisons across student groups. Because students with data on any particular outcome may differ from other students, any analyses based on this partial dataset without adjustments for missing data are likely to be biased. Solutions such as complete case analysis, which use only cases with complete data to conduct analyses, or mean imputation, which fills in missing values of a variable with the mean of existing values, pose the same risk of bias.

However, multiple imputation (MI) is an appropriate solution for the problem of missing data due to nonresponse in this study. MI is a form of stochastic imputation that reduces bias by adding to predicted values a randomly drawn residual term with a mean of zero and a variance

equal to the posterior variance of the predicted variables given the observed information. MI improves estimates through multiple iterations of this process, drawing multiple values that are used in the analysis. If data are MAR, MI provides unbiased estimates (Rubin, 2004). Missing data in this study are assumed to be MAR for the purposes of analysis. While nonresponse is partially accounted for by grade level, as shown in Table 5, and may be also correlated with student gender and GPA, missingness is assumed to be unrelated to the value of outcomes of interest including vocational identity or aspirations after accounting for these factors.

MI reduces bias in estimates even when a large proportion of data is missing, as in the current study. Madley-Dowd, Hughes, Tilling, and Heron (2019) found, through simulations, that unbiased estimates are possible even with data that are 90% missing, if the imputation model is properly specified and data are MAR. Proper specification involves including auxiliary variables, variables correlated with missingness that provide additional information and increase the plausibility of the MAR assumption.

Because the survey covered a wide range of topics, a number of auxiliary variables are available to improve imputation estimates. For example, while parent education data are missing for a large proportion of survey-takers, additional survey questions asked students to report their subjective views of their families' finances as well as their parents' occupations, which were coded and transformed into GSS socioeconomic index scores. Additionally, the administrative data included FRPL status. Table 6 presents the average subjective family finance scores, parent occupational scores, and FRPL status for all students for whom these data were available, grouped by parent education level. As the table shows, this information is correlated with parent education and therefore provides useful auxiliary information.

Table 6: Socioeconomic Scores by Average Parent Education

| | Less than high school | High school | Some college | Associate degree | Bachelor's degree | Advanced degree |
|---|---|---|---|---|---|---|
| **Average GSS socioeconomic index score (n=704)** | 36.0 | 43.7 | 44.9 | 52.9 | 58.0 | 66.0 |
| **Average subjective family finances score (n=932)** | 3.0 | 3.2 | 3.3 | 3.6 | 3.7 | 3.7 |
| **FRPL proportion (n=834)** | .60 | .39 | .40 | .26 | .17 | .15 |

In addition to information about parent occupations, a range of other information was collected on the survey and used as auxiliary variables. Missing data were imputed with MI using chained equations on Stata. Table 7 presents each variable in the imputation model, including auxiliary variables, and the proportion of missingness for each variable.

Table 7: Descriptions of Multiple Imputation Models

| | Proportion of missing data (%) |
|---|---|
| **Dependent variables** | |
| Vocational identity | 2.9 |
| Self-reported career knowledge | 14.1 |
| Educational level salary estimates | 13.4 |
| Educational aspirations | 21.0 |
| Career aspirations | 38.6 |
| Occupational alignment | 50.2 |
| **Independent variables** | |
| Trades concentrator, college concentrator, or non-concentrator | 12.0 |
| Parent college-expectations | 6.7 |

Table 7, continued

| | |
|---|---|
| Interaction terms | |
| Grade 9 x Trades concentrator | 15.6 |
| Grade 10 x Trades concentrator | 15.6 |
| Grade 11 x Trades concentrator | 15.6 |
| Grade 12 x Trades concentrator | 15.6 |
| Grade level | 2.2 |
| Parent education | 17.9 |
| Race/Ethnicity | 3.8 |
| Gender | 5.2 |
| **Additional auxiliary variables** | |
| GSS socioeconomic index score | 32.7 |
| Subjective family finance score | 10.9 |
| Free/reduced-price lunch status | 20.3 |
| Need to support family is a barrier to achieving goals | 32.6 |
| ACT/SAT tutoring | 2.2 |
| School valuing | 7.3 |
| GPA | 20.3 |

## *Analysis*

### Descriptives

I first display descriptive information showing how non-concentrators, trades concentrators, and college concentrators compared in terms of demographic characteristics and achievement. These descriptives respond to the first research question on how evenly various student subgroups – including students grouped by grade level, gender, racial/ethnic identity, parent education levels, FRPL status, academic achievement, and school valuing – were represented across the types of concentrators. I also display descriptive information about each concentrator group in terms of the outcomes of interest, including postsecondary ambitions and

vocational development, before presenting the results of the regression models estimates of these outcomes for each concentrator group.

**Regressions**

I then display the results of the regression models that predicted the outcomes of trades concentrators compared to non-concentrators and college concentrators, controlling for confounding characteristics. Separate models were run for each outcome. Estimates of postsecondary ambitions (educational goals, career goals, and occupational alignment) were obtained with ordered logistic regressions, while estimates of vocational development (vocational identity, career knowledge, salary estimates) were obtained using multiple linear regression models. Table 8 shows the correlations between the variables in the models using the imputed datasets. Correlations between ethnic groups reflect correlations between their empty categories.

Table 8: Correlations Between Variables in Models Predicting Vocational Development and Aspirations

| Variables | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| (1) Trades concentrator | 1.000 | | | | | |
| (2) Non-concentrator | -0.448 | 1.000 | | | | |
| (3) College concentrator | -0.293 | -0.738 | 1.000 | | | |
| (4) Parent college-expectations | -0.201 | -0.148 | 0.298 | 1.000 | | |
| (5) Grade level | -0.107 | -0.019 | 0.089 | 0.024 | 1.000 | |
| (6) Parent education | -0.040 | -0.175 | 0.212 | 0.137 | 0.036 | 1.000 |
| (7) Asian American | -0.017 | -0.071 | 0.088 | 0.012 | 0.090 | 0.077 |
| (8) Black | -0.014 | 0.025 | -0.015 | -0.008 | -0.006 | -0.006 |
| (9) Hispanic | -0.069 | 0.084 | -0.050 | 0.036 | -0.029 | -0.207 |
| (10) White | 0.073 | -0.062 | 0.024 | -0.033 | -0.002 | 0.162 |
| (11) Male | 0.374 | -0.013 | -0.259 | -0.125 | -0.019 | 0.017 |

| Variables | (7) | (8) | (9) | (10) | (11) |
|---|---|---|---|---|---|
| (1) Trades concentrator | | | | | |
| (2) Non-concentrator | | | | | |
| (3) College concentrator | | | | | |

Table 8, continued

| Variables | (7) | (8) | (9) | (10) | (11) |
|---|---|---|---|---|---|
| (4) Parent college-expectations | | | | | |
| (5) Grade level | | | | | |
| (6) Parent education | | | | | |
| (7) Asian American | 1.000 | | | | |
| (8) Black | -0.031 | 1.000 | | | |
| (9) Hispanic | -0.066 | -0.101 | 1.000 | | |
| (10) White | -0.254 | -0.391 | -0.817 | 1.000 | |
| (11) Male | 0.000 | -0.003 | 0.023 | -0.020 | 1.000 |

The ordered logistic regressions estimated $Y_i$, the ordinal response variable (education goal, career goal, or occupational alignment) with C categories for student i and covariates $\mathbf{x}_i$. The cumulative probability that $Y_i$ will belong to a given category can be represented as

$$p_{ci} = \Pr(Y_i \leq y_c | \mathbf{X}_i = x), c = 1, \ldots, C$$

where **x** is a vector representing student covariates. The ordered logit model contains C-1 equations that link the cumulative probabilities to a linear predictor, $\beta' x_i$,:

$$\text{logit}(p_{ci}) = \log\left(\frac{p_{ci}}{1-p_{ci}}\right) \quad (1)$$

$$= a_c + \beta' x_i, c = 1, 2, \ldots, C-1$$

$$= a_c + (\beta_0 + \beta T_i + \beta L_i + \beta \mathbf{x}_i), c = 1, 2, \ldots, C-1$$

where $a_c$ represents thresholds between ordered groups with C categories, $T_i$ represents status as a trades concentrator for student i, $L_i$ represents status as a college concentrator for student i (with non-concentrator serving as the reference category), and $\mathbf{x}_i$ is a vector representing covariates for student i (Grilli & Rampichini, 2014).

The multiple regression models estimating vocational identity, career knowledge, and salary estimates can be represented as

$$Y_i = \beta_0 + \beta T_i + \beta \mathbf{x}_i + e_i \quad (2)$$

where $Y_i$ represents the estimated outcome for student i, $T_i$ represents status as a trades concentrator, college concentrator, or non-concentrator for student i, $\mathbf{x}_i$ is a vector representing covariates for student i, and $e_i$ represents random error for student i.

For each outcome variable in the ordered logistic and linear regression models, I ran three models that included differing covariates in vector **x**. In the first set of models, **x** included grade level, parent years of education, racial/ethnic identity, and gender. Parent education was used as a predictor in place of FRPL status because it accounted for more variation in the outcomes. I did not control for student GPA in the models, since student academic achievement is likely in part an outcome of being a trades concentrator, college concentrator, or non-concentrator. The second set of models added parent college expectations to the list of covariates in order to remove the influence of this difference between students, assuming that much of the parents' expectations are set before students enter high school. However, controlling for parent college expectations also potentially attenuated the relationship between trades concentrator status and various outcomes, since student experiences in CTE and other school programs could lead parents to adjust their expectations over time. The third set of models included interactions between trades concentrator status and grade level (omitting parent expectations as a predictor). Including these interaction terms allows us to discern whether the relationships between trades concentration and the outcome variables depend on grade level.

While differences across grade levels may be intuitively interpreted as differences across adolescent developmental stages, it is important to note that there may be a number of other reasons for these differences. Different grade levels have differing age cohorts, which in turn may have differences in demographic composition. These differences are in part due to selection

effects, with approximately 1 in 10 OHS students dropping out before the end of their senior year (and potentially before the start of senior year). Additionally, students in different grade levels have had differing cohort experiences as the school's priorities and policies have changed over time. As previously described, many of the efforts to revamp CTE were new in the 2019-2020 school year when the survey was administered. As a result, seniors' experiences with CTE over the course of their time in high school will be very different from freshmen's experiences.

In turn, relationships that grow stronger or weaker as grade level increases could suggest a number of things. It could be that a) being a trades concentrator (having participated in at least two trades courses with plans to accumulate at least three sequential trades courses) has a cumulative impact over time, b) students who become trades concentrators over time by accumulating coursework differ from students who do not become concentrators over time in terms of the outcome variable (in other words, selection effects could differ across grade levels), or c) trades concentrators in different cohorts had varying cohort-specific experiences that affected their outcomes.

**Marginal Mean Weighting with Stratification**

While multivariate regression is perhaps the most common way to control for confounders in estimating the relationship between a predictor and outcome, it can lead to biased estimates if comparisons between groups are based on extrapolation. This may occur when comparison groups differ so much from each other in terms of model covariates (e.g., gender, race, socioeconomic status) that predictions are based on values outside of the observed range of covariates for each group (King & Zeng, 2006). The risk of extrapolation creating biased estimates is high in the current study, since the comparison groups – non-concentrators, trades concentrators, and college concentrators – vary widely in terms of important covariates.

In addition to the regression models described above, I use marginal mean weighting with stratification (MMWS; Hong, 2010, 2012, 2015) to estimate the impact of being a trades concentrator (our "treatment group") as opposed to a college concentrator or a non-concentrator (our two "control groups") on the outcomes of interest. MMWS uses weighting to non-parametrically transform the pre-existing covariate distribution of the treatment groups with the goal of increasing comparability and reducing selection bias. The method involves estimating for each individual a propensity score associated with each of the treatment conditions, then stratifying the sample based on the propensity score such that the "treatment" and "control" conditions within each stratum have the same or very similar propensity score values. Following stratification, weights are assigned to units in each corresponding treatment group in order to transform the pretreatment composition to approximate the composition of the target population.

This weighting simulates randomization, providing estimates of the between-group mean difference in each outcome that we would observe if students were randomly assigned to being a non-concentrator versus a trades concentrator, or a college concentrator versus a trades concentrator. MMWS is robust to misspecification of the propensity score model and misspecification of the outcome model. The results are devoid of selection bias associated with the observed covariates (Hong, 2010).

To remove selection bias associated with the observed covariates, I included in the propensity score model GPA, FRPL status, and subjective family finances as covariates in addition to grade level, racial/ethnic identity, gender, and parent education. I also included an interaction between subjective family finances and grade level. GPA was not included in regression models in order to avoid "controlling away" an important source of difference in the outcomes between the populations that the CTE courses are designed to address. In turn, while

the regression models tell us about the outcomes of trades concentrators who may have decided on the trades in part because of their academic performance, the MMWS models tell us how trades concentrators would have fared under counterfactual conditions such as becoming a non-concentrator or a college concentrator, without changing their academic performance.

I first compared trades concentrators to non-concentrators, estimating the average treatment effect on the "treated" students (i.e., the effect on students exposed to trades concentrator status). Let Z=1 if a student is a trades concentrator and Z=0 if a non-concentrator. The propensity score model for this estimation took the form,

$$\ln \frac{\Pr\,(Z_i=1|x_i)}{1-\Pr\,(Z_i=1|x_i)} = \beta_0 + \beta \mathbf{x}_i \tag{3}$$

where the list of x covariates for student i included grade level, racial/ethnic identity, parent education, gender, FRPL status, GPA, subjective family finances, and an interaction between subjective family finances and grade level. Estimated propensity scores are stratified into S strata. If the student is a trades concentrator, the MMWS weight is equal to 1:

$$\text{MMWS} = 1 \tag{4}$$

For non-concentrators in stratum s:

$$\begin{aligned} \text{MMWS} &= \frac{\text{pr}(S = s \mid Z = 1)}{\text{pr}(S = s \mid Z = 0)} \\ &= \frac{\text{pr}(Z=0)}{\text{pr}(Z=1)} \times \frac{\text{pr}(Z=1|S=s)}{\text{pr}(Z=0|S=s)} \end{aligned} \tag{5}$$

To compare college concentrators to trades concentrators, the same propensity score model was used. The MMWS weights were also calculated in the same way as for the non-concentrator to trades concentrator comparisons. After running the MMWS models, I checked the balance on the between-group mean difference in each logit propensity score, as well as the covariates, to ensure that the simulated samples approximated covariate balance in a randomized experiment. It

is important to note that the three treatment groups may still differ in unobserved covariates. Finally, I estimated treatment effects by applying the MMWS weights to the treatment groups using one-way ANOVA models.

## Results

### *Survey Respondent Demographics*

Just over half of the respondents were non-concentrators (neither trades concentrators nor college concentrators), while 17% were trades concentrators and almost one-third were college concentrators. Table 9 presents the demographic information for the survey respondents, using imputed data. (See Appendix D for demographic information using pre-imputation data.) The information presented in this table provides responses to the first research question, which asked how evenly various student subgroups were represented among the non-concentrator, trades concentrator, and non-concentrator groups. We see differences in subgroup representation across each of these concentrator groups.

While non-concentrators were represented proportionately across grade levels, trades concentrators were overrepresented in grade 9 and underrepresented in grade 12. In some ways, this is surprising, since CTE concentration requires students to take multiple CTE courses in the

Table 9: Survey Respondent Demographics and School Valuing Across Concentrator Groups

| | All respondents | Non-concentrators | Trades concentrators | College concentrators |
|---|---|---|---|---|
| | % | % | % | % |
| **Percent of all respondents** | 100.0 | 52.3 | 16.9 | 30.8 |
| **Grade level** | | | | |
| 9 | 25.5 | 27.2 | 30.5 | 19.9 |
| 10 | 29.1 | 28.5 | 29.8 | 29.6 |
| 11 | 26.4 | 25.4 | 25.6 | 28.5 |
| 12 | 19.1 | 19.0 | 14.1 | 22.1 |

Table 9, continued

| | All respondents | Non-concentrators | Trades concentrators | College concentrators |
|---|---|---|---|---|
| | % | % | % | % |
| **Gender** | | | | |
| Female | 49.7 | 50.3 | 12.4 | 69.3 |
| Male | 50.3 | 49.7 | 87.6 | 30.7 |
| **Race/Ethnicity** | | | | |
| White | 75.9 | 73.2 | 82.2 | 77.1 |
| Latino | 17.4 | 20.8 | 11.6 | 14.8 |
| Black or African American | 4.6 | 5.0 | 4.3 | 4.2 |
| Asian American | 2.0 | 1.0 | 1.6 | 3.9 |
| Other (including mixed race) | 0.1 | 0.1 | 0.4 | 0.0 |
| **Highest parent education** | | | | |
| Less than high school | 7.8 | 10.9 | 6.9 | 3.7 |
| High school | 27.1 | 29.6 | 30.1 | 22.1 |
| Some college, no degree | 16.8 | 17.2 | 22.7 | 13.6 |
| Associate degree | 12.9 | 14.05 | 9.5 | 12.6 |
| Bachelor's degree | 22.1 | 20.4 | 19.3 | 25.9 |
| Advanced | 13.3 | 7.8 | 11.8 | 22.1 |
| **Free/reduced-price lunch** | | | | |
| No | 64.8 | 57.0 | 69.9 | 75.5 |
| Yes | 35.2 | 43.1 | 30.1 | 24.5 |
| **GPA** | | | | |
| GPA < 2.0 | 10.0 | 14.3 | 13.8 | 1.0 |
| GPA between 2.0 and 2.9 | 28.9 | 38.1 | 35.9 | 9.6 |
| GPA between 3.0 and 3.9 | 40.1 | 37.8 | 39.7 | 44.2 |
| GPA between 4.0 and 5 | 20.3 | 9.4 | 10.3 | 44.5 |
| **School valuing score** | -0.02 | -0.16 | -0.13 | 0.29 |

same pathway and grade 12 students have had many more opportunities to accumulate that coursework than grade 9 students. It could be the case that students take CTE coursework early in their high school careers, with plans to concentrate in the future, but then change their plans as they progress through grade levels. The more likely scenario, however, is that the increased proportion of trades concentrators in grade 9 reflects OHS's new CTE facilities and coursework

options, which were opened in the 2019-2020 school year when the survey took place. While underclassmen who had taken two CTE courses and had plans to take a third were counted as CTE concentrators, grade 12 students needed at least three courses in a program of study to be counted as concentrators, and they had had limited time to take advantage of the new facilities.

College concentrators, on the other hand, were slightly underrepresented in grade 9 and overrepresented in grade 12. This measure is not based on coursework, but rather on students' college planning, so the increase over grade levels is not due to students accumulating more college-relevant coursework. Instead, it could be the case that students become more college-oriented over time. It could also be the case that grade 12 students recognized the limited time frame they would have to pursue the new CTE coursework options, while grade 9 students saw that they would have ample time to complete this coursework and pursue a sub-baccalaureate CTE pathway. These cohort differences could have contributed to seniors' stronger college orientation and freshmen's stronger CTE orientation.

We also see differences across the concentrator groups in terms of gender and racial/ethnic identity. Non-concentrators were split evenly between the gender groups, with an underrepresentation of white students and an overrepresentation of Latino students. The trades concentrators, on the other hand, were overwhelmingly male, and they were more likely to be white and less likely to be minority racial/ethnic groups (with the exception of "Other") than survey-takers as a whole. College concentrators were over two-thirds female, and they were slightly more likely to be white or Asian American and less likely to be Latino than survey respondents as a whole.

Parent education levels and FRPL status also varied across the concentrator groups. Non-concentrators and trades concentrators had slightly lower reports of highest parent education than

survey-takers as a whole, with less than a third in each group reporting a bachelor's or advanced degree as the highest level of education for either parent. Despite the similarity between non-concentrators and trades concentrators in highest parent education, trades concentrators had much lower participation in FRPL than non-concentrators. This suggests that trades concentrators' parents worked in higher-paying jobs than non-concentrators' parents, despite having similar education levels. College concentrators had higher parent education levels than either group, with almost half reporting that at least one of their parents had a bachelor's or an advanced degree. Unsurprisingly, they also had the lowest rates of FRPL participation.

College concentrators also varied substantially from the other groups in terms of GPA. Non-concentrators and trades concentrators had similar GPAs, with about half of each group having a GPA below 3.0 and just one in ten with a GPA above 4.0 (indicating success in honors coursework). Among college concentrators, just one in ten had a GPA below 3.0, and almost half had a GPA between 4.0 and 5.0.

Finally, concentrator groups varied in terms of their self-reported school valuing, a measure that comprised seven items assessing the extent to which respondents valued what they learned in school and felt it would be important for their futures (s.d. 0.87). Non-concentrators and trades concentrators had lower than average school valuing scores, with non-concentrators scoring a fifth of a standard deviation below average and trades concentrators scoring almost as low. College concentrators, on the other hand, scored over half of a standard deviation higher than both non-concentrators and trades concentrators.

Overall, trades concentrators were distinguished by their overrepresentation in grade 9 and underrepresentation in grade 12, their composition as almost exclusively male, and their higher likelihood of being white and lower likelihood of being Latino than other student groups.

Despite reporting lower levels of parent education than average students, they were less likely to participate in the FRPL program than survey respondents as a whole. They were lower-achieving and valued school less than typical students, with GPAs and school valuing scores similar to those of non-concentrators.

### *Survey Respondent Descriptive Outcomes*

#### Postsecondary Aspirations: Education Goals, Career Goals, and Occupational Alignment

Table 10 shows how respondents described their educational aspirations, career aspirations, and the alignment between these responses. Overall, two-thirds of all respondents who responded to these questions aspired to achieve a bachelor's or advanced degree, and the majority also identified ideal careers at age 30 that required bachelor's or advanced degrees. In turn, the vast majority of respondents had educational and occupational ambitions that were aligned or only modestly under-aligned or over-aligned, with a slight leaning toward over-alignment (aspiring to a higher level of education than their ideal job required).

Non-concentrators had slightly lower educational aspirations than survey respondents as a whole, but more than half aspired to a bachelor's or advanced degree, and even more aspired to jobs that required these degrees. In turn, while most non-concentrators had aspirations that were either aligned or modestly under-aligned or over-aligned, they were more likely than survey respondents as a whole to have under-aligned ambitions (aspiring to a lower level of education than their ideal job required).

Table 10: Survey Respondent Educational Aspirations, Career Aspirations, and Occupational Alignment

| | All respondents | Non-concentrators | Trades concentrators | College concentrators |
|---|---|---|---|---|
| | % | % | % | % |
| **Percent of all respondents** | 100.0 | 52.3 | 16.9 | 30.8 |
| **Educational aspirations** | | | | |
| High school or lower | 14.2 | 20.8 | 19.7 | 0.1 |
| Sub-baccalaureate credential | 19.1 | 24.8 | 30.0 | 3.5 |
| Bachelor's or advanced degree | 66.7 | 54.4 | 50.6 | 96.3 |
| **Career aspirations** | | | | |
| Job requires less than high school diploma | 1.1 | 1.0 | 0.5 | 1.5 |
| Job requires high school diploma | 8.6 | 7.8 | 16.6 | 6.0 |
| Job requires vocational school training, on-the-job experience, or associate degree | 30.0 | 34.7 | 24.0 | 25.6 |
| Job requires BA | 31.9 | 32.5 | 27.9 | 33.2 |
| Job requires master's, PhD, MD, or JD | 28.3 | 24.3 | 31.0 | 33.7 |
| **Occupational alignment** | | | | |
| -4 (educational aspirations much lower than desired occupation requires) | 0.1 | 0.9 | 0.4 | 0.0 |
| -3 | 3.0 | 4.4 | 3.9 | 0.0 |
| -2 | 8.8 | 11.5 | 13.5 | 1.6 |
| -1 | 20.5 | 24.5 | 22.9 | 12.1 |
| 0 (educational aspirations appropriate for desired occupation) | 31.2 | 27.0 | 30.5 | 38.0 |
| 1 | 24.1 | 21.7 | 20.4 | 29.6 |
| 2 | 9.6 | 8.2 | 6.6 | 13.6 |
| 3 | 2.0 | 0.9 | 1.0 | 4.2 |
| 4 (educational aspirations much higher than desired occupation requires) | 0.9 | 0.8 | 0.9 | 0.9 |

Trades concentrators were equally likely to aspire to a level of education less than a BA as they were to aspire to a bachelor's or advanced degree, resulting in the lowest educational aspirations of any group. However, they were as likely to aspire to a job requiring at least a BA as survey respondents as a whole. In turn, they had similar rates of under-alignment as non-concentrators.

College concentrators had the highest educational ambitions of any group, with 96% aiming for a BA or higher. However, the proportion of college concentrators who aspired to careers that required at least a BA was slightly lower, at about 67%. Therefore, while they had the highest proportion of students with aligned ambitions and the lowest proportion with under-aligned ambitions, the college concentrators were the most likely of any group to have over-aligned ambitions.

### Vocational Development: Vocational Identity, Career Knowledge, and Salary estimates

Table 11 presents descriptive data on how survey respondents compare on vocational identity, self-reported knowledge about their desired occupation, and knowledge about typical salary ranges for various education levels. Scores were transformed into z-scores for the purposes of comparison. While higher scores on vocational identity and career knowledge indicate that respondents identified strongly with an occupation and felt knowledgeable about it, higher scores on salary estimates indicate that respondents overestimated the salaries of various education levels (while lower scores indicate underestimation, and scores closer to 0 reflect more accurate knowledge of typical returns to each degree). Breaking down the salary estimate scores reveals that, on average, respondents as a whole overestimated the median salaries of every education level except advanced degrees, which they slightly under-estimated. The

underestimation of advanced degree salaries may be due to a ceiling on the response options, which allowed estimates of only up to $100,000.

Table 11: Survey Respondent Vocational Identity, Career Knowledge, and Salary Estimates

| | **All respondents** | | **Non-concentrators** | | **Trades concentrators** | | **College concentrators** | |
|---|---|---|---|---|---|---|---|---|
| | Average score | S.D. | Average score | S.D. | Average score | S.D. | Average score | S.D. |
| **Vocational identity** | 0.0 | 1.00 | -0.20 | 0.91 | 0.27 | 1.07 | 0.19 | 1.02 |
| **Self-reported career knowledge** | 0.0 | 1.00 | -0.21 | 1.04 | 0.21 | 0.94 | 0.25 | 0.87 |
| **Education level salary estimates** | 0.0 | 1.00 | 0.06 | 1.02 | 0.25 | 1.08 | -0.24 | 0.86 |

Non-concentrators had lower average vocational identity scores and self-reported career knowledge about the career they wanted to pursue. Their salary estimate score, however, was closer to 0 than that of the other concentrator groups, indicating more accurate average estimates of the average returns to various education levels. Trades concentrators had the highest vocational identity scores of any group, with an average of 0.27 standard deviations above the mean. They also scored higher than average on self-reported knowledge about the occupation of their choosing. However, they overestimated the average salaries at various levels of education. They especially inflated estimates of the median salaries of worker with occupational credentials, which, on average, they estimated as earning $20,000 more than the 2018 annual median salary of $40,100. College concentrators also scored higher than average for vocational identity and self-reported career knowledge. However, they tended to underestimate the average salaries of various educational degrees.

### *Regression Models*

#### Predicting Postsecondary Aspirations

The next set of tables display the outcomes of regression models that controlled for student demographic characteristics (grade level, parent education, gender, and racial/ethnic identity) and parent expectations. The models in Table 12 show that educational aspirations increased as grade levels rose, such that they were significantly higher among seniors than among freshmen. For seniors, the odds of aspiring to a sub-baccalaureate credential rather than a high-school diploma, or to a BA rather than a sub-baccalaureate credential, were between 2.37 and 2.57 higher than for freshmen, depending on the model. The level of education required by the careers to which the students aspired, on the other hand, decreased as grade level increased, although these differences were not significant, as shown in Table 13. In turn, Table 14 shows that the occupational alignment scores were higher among more advanced students (indicating that their aspirations are more likely to be over-aligned), but the difference is not large enough to have statistical significance.

Table 12: Ordinal Logistic Regression Models Predicting Educational Aspirations

| **Predicting educational aspirations** | Basic model | | | Including parent expectations | | | Including trades concentrator x grade level | | |
|---|---|---|---|---|---|---|---|---|---|
| | OR | 95% CI | Sig. | OR | 95% CI | Sig. | OR | 95% CI | Sig. |
| Non-concentrator | | | | | | | | | |
| Trades concentrator | 1.15 | (0.73, 1.82) | | 1.44 | (0.90, 2.31) | | 1.31 | (0.59, 2.91) | |
| College concentrator | 17.63 | (9.08, 34.21) | *** | 14.86 | (0.57, 29.17) | *** | 16.22 | (8.04, 32.70) | *** |
| Parent college expectations | | | | 1.51 | (1.33, 4.81) | *** | | | |
| Grade 10 x Trades concentrator | | | | | | | 0.71 | (0.24, 2.08) | |

Table 12, continued

| **Predicting educational aspirations** | Basic model | | | Including parent expectations | | | Including trades concentrator x grade level | | |
|---|---|---|---|---|---|---|---|---|---|
| | OR | 95% CI | Sig. | OR | 95% CI | Sig. | OR | 95% CI | Sig. |
| Grade 11 x Trades concentrator | | | | | | | 0.62 | (0.21, 1.82) | |
| Grade 12 x Trades concentrator | | | | | | | 0.35 | (0.08, 1.56) | |
| Grade 10 | 1.29 | (0.83, 2.00) | | 1.27 | (0.81, 2.01) | | 1.36 | (0.78, 2.38) | |
| Grade 11 | 1.34 | (0.85, 2.10) | | 1.53 | (2.46, 4.52) | | 1.36 | (0.79, 2.33) | |
| Grade 12 | 2.37 | (1.38, 4.09) | ** | 2.57 | (1.46, 4.52) | | 2.34 | (1.22, 4.47) | * |
| Parent education | 1.15 | (1.08, 1.22) | *** | 1.27 | (1.07, 1.21) | ** | 1.15 | (1.08, 1.23) | *** |
| Latino | 0.99 | (0.65, 1.51) | | 0.84 | (0.55, 1.29) | | 1.13 | (0.72, 1.80) | |
| Black | 0.93 | (0.46, 1.91) | | 0.89 | (0.43, 1.87) | | 0.94 | (0.44, 2.01) | |
| Asian American | 1.68 | (0.31, 9.01) | | 1.98 | (0.36, 10.97) | | 1.58 | (0.28, 8.96) | |
| Male | 0.48 | (0.34, 0.69) | *** | 0.49 | (0.34, 0.70) | *** | 0.49 | (0.34, 0.72) | *** |

*** p<.001, ** p<.01, * p<.05

Note: Models using college concentrators as the base group found that trades concentrators have statistically significantly lower odds than college concentrators at p<.001 in all models.

Table 13: Ordinal Logistic Regression Models Predicting Career Aspirations

| **Predicting career aspirations** | Basic model | | | Including parent expectations | | | Including trades concentrator x grade level | | |
|---|---|---|---|---|---|---|---|---|---|
| | OR | 95% CI | Sig. | OR | 95% CI | Sig. | OR | 95% CI | Sig. |
| Non-concentrator | | | | | | | | | |
| Trades concentrator | 1.07 | (0.66, 1.72) | | 1.13 | (0.70, 1.84) | | 1.20 | (0.53, 2.69) | |
| College concentrator | 1.59 | (1.12, 2.25) | * | 1.47 | (1.03, 2.11) | * | 1.70 | (1.17, 2.48) | ** |
| Parent college expectations | | | | 1.10 | (0.99, 1.22) | | | | |

Table 13, continued

| **Predicting career aspirations** | Basic model | | | Including parent expectations | | | Including trades concentrator x grade level | | |
|---|---|---|---|---|---|---|---|---|---|
| | OR | 95% CI | Sig. | OR | 95% CI | Sig. | OR | 95% CI | Sig. |
| Grade 10 x Trades concentrator | | | | | | | 1.49 | (0.44, 5.05) | |
| Grade 11 x Trades concentrator | | | | | | | 0.74 | (0.23, 2.39) | |
| Grade 12 x Trades concentrator | | | | | | | 0.51 | (0.13, 2.09) | |
| Grade 10 | 1.13 | (0.76, 1.69) | | 1.13 | (0.75, 1.68) | | 1.05 | (0.65, 1.68) | |
| Grade 11 | 1.00 | (0.67, 1.49) | | 1.01 | (0.68, 1.51) | | 0.97 | (0.60, 1.56) | |
| Grade 12 | 0.82 | (0.54, 1.26) | | 0.82 | (0.54, 1.26) | | 0.78 | (0.48, 1.28) | |
| Parent education | 0.99 | (0.95, 1.04) | | 0.99 | (0.94, 1.04) | | 1.00 | (0.95, 1.05) | |
| Latino | 1.17 | (0.79, 1.72) | | 1.14 | (0.77, 1.69) | | 1.15 | (0.75, 1.75) | |
| Black | 0.71 | (0.30, 1.71) | | 0.71 | (0.30, 1.70) | | 0.59 | (0.23, 1.51) | |
| Asian American | 0.59 | (0.20, 1.75) | | 0.59 | (0.20, 1.77) | | 0.61 | (0.19, 1.92) | |
| Male | 0.80 | (0.58, 1.11) | | 0.81 | (0.59, 1.12) | | 0.78 | (0.55, 1.11) | |

*** p<.001, ** p<.01, * p<.05

Note: Models using college concentrators as the base group found that trades concentrators are not statistically significantly different from college concentrators in any of the models.

Table 14: Ordinal Logistic Regression Models Predicting Occupational Alignment

| **Predicting occupational alignment** | Basic model | | | Including parent expectations | | | Including trades concentrator x grade level | | |
|---|---|---|---|---|---|---|---|---|---|
| | OR | 95% CI | Sig. | OR | 95% CI | Sig. | OR | 95% CI | Sig. |
| Non-concentrator | | | | | | | | | |
| Trades concentrator | 1.01 | (0.65, 1.56) | | 1.04 | (0.67, 1.63) | | 1.12 | (0.51, 2.47) | |
| College concentrator | 2.20 | (1.60, 3.03) | *** | 2.08 | (1.50, 2.87) | *** | 2.05 | (1.45, 2.88) | *** |

Table 14, continued

| **Predicting occupational alignment** | Basic model | | | Including parent expectations | | | Including trades concentrator x grade level | | |
|---|---|---|---|---|---|---|---|---|---|
| | OR | 95% CI | Sig. | OR | 95% CI | Sig. | OR | 95% CI | Sig. |
| Parent college expectations | | | | 1.08 | (0.98, 1.20) | | | | |
| Grade 10 x Trades concentrator | | | | | | | 0.68 | (0.23, 1.99) | |
| Grade 11 x Trades concentrator | | | | | | | 0.73 | (0.26, 2.07) | |
| Grade 12 x Trades concentrator | | | | | | | 0.71 | (0.18, 2.75) | |
| Grade 10 | 1.15 | (0.76, 1.76) | | 1.15 | (0.75, 1.75) | | 1.25 | (0.75, 2.08) | |
| Grade 11 | 1.25 | (0.82, 1.89) | | 1.26 | (0.83, 1.91) | | 1.28 | (0.79, 2.08) | |
| Grade 12 | 1.42 | (0.94, 2.14) | | 1.42 | (0.94, 2.14) | | 1.41 | (0.89, 2.23) | |
| Parent education | 1.09 | (1.05, 1.13) | *** | 1.09 | (1.04, 1.13) | *** | 1.09 | (1.04, 1.14) | *** |
| Latino | 0.87 | (0.61, 1.23) | | 0.84 | (0.59, 1.20) | | 0.92 | (0.62, 1.35) | |
| Black | 0.93 | (0.48, 1.81) | | 0.93 | (0.48, 1.82) | | 0.92 | (0.45, 1.87) | |
| Asian American | 1.48 | (0.58, 3.77) | | 1.46 | (0.57, 3.76) | | 1.34 | (0.49, 3.64) | |
| Male | 0.84 | (0.62, 1.15) | | 0.85 | (0.62, 1.15) | | 0.85 | (0.61, 1.19) | |

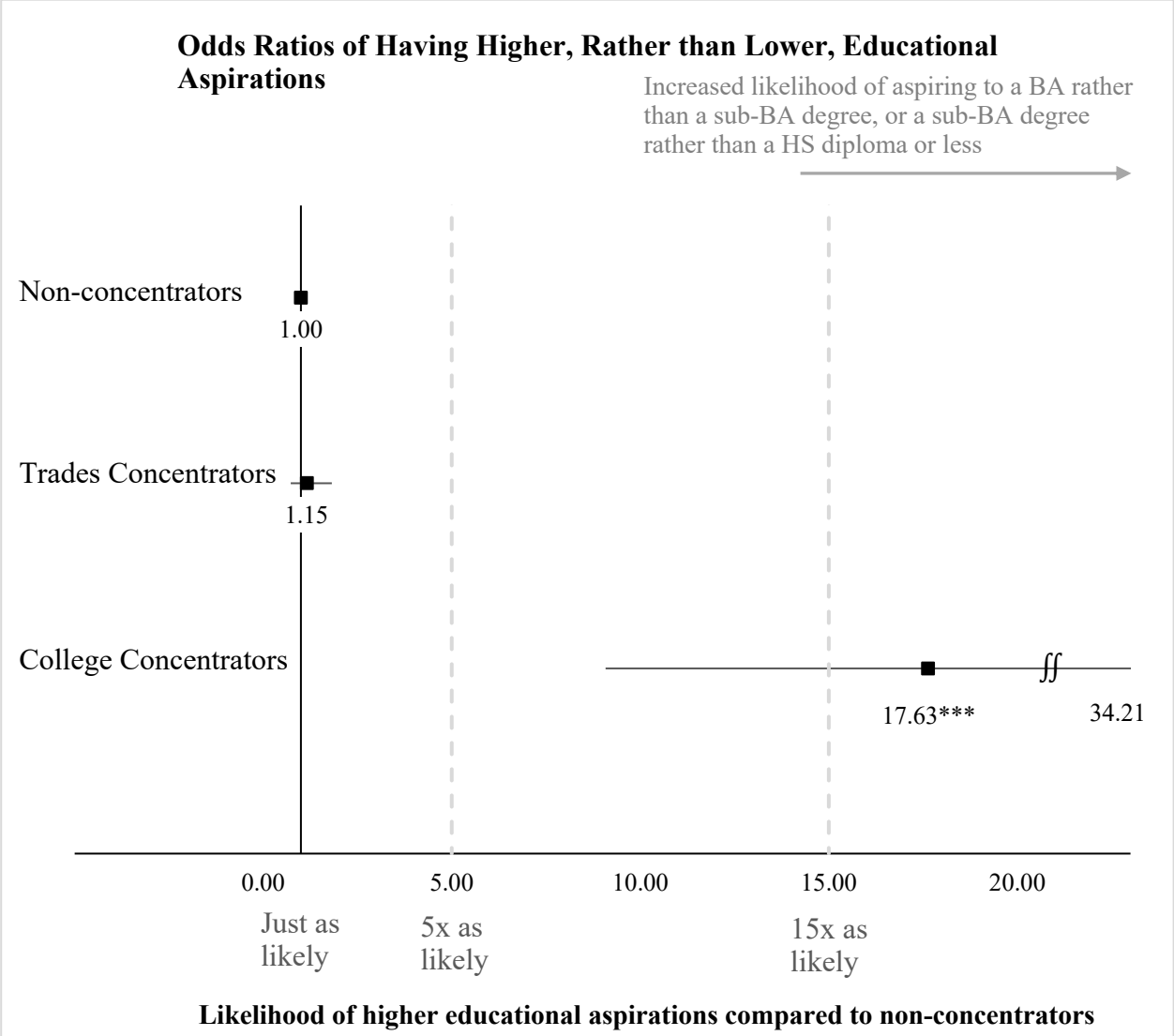
*** p<.001, ** p<.01, * p<.05

Note: Models using college concentrators as the base group found that trades concentrators are less likely to show over-alignment than college concentrators at p<.01 in the first two models (basic model and model including parent expectations). In the model that includes interactions between trades concentrators and grade level, trades concentrator scores are not significantly different from those of college concentrators.

Figures 3-5 display output from the basic models to show how trades concentrators and college concentrators compared to non-concentrators in educational aspirations, career aspirations, and occupational alignment, controlling for student covariates. When comparing

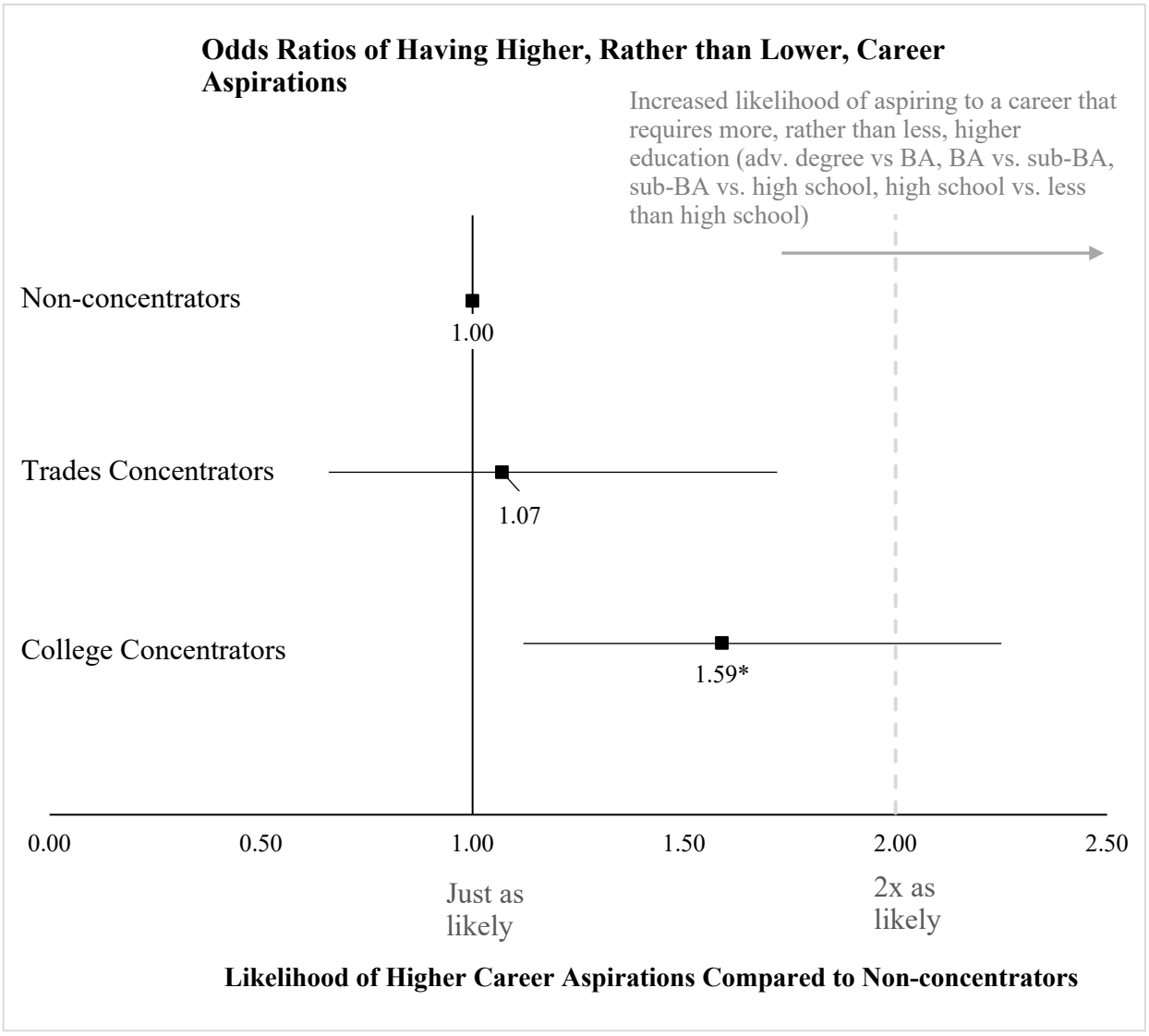
non-concentrators to trades concentrators and college concentrators, we see that college concentrators have significantly higher educational aspirations than non-concentrators and trades concentrators, as shown in Table 12 and Figure 3. In fact, they were an impressive 17.63 times as likely as non-concentrators to aspire to a BA rather than a sub-baccalaureate credential. Separate model output not displayed here shows how trades concentrators compared to college concentrators, revealing that college concentrators had higher educational aspirations at $p<.001$. Trades concentrators' educational aspirations were not statistically significantly different from those of non-concentrators.

College concentrators also had higher odds than non-concentrators and trades concentrators of aspiring to a career that requires a higher level of education (although the difference with trades concentrators was not statistically significant), as shown in Table 13 and Figure 4. However, they were still more likely than non-concentrators and trades concentrators to have aspirations that were over-aligned – that is, they were more likely to aspire to a level of education beyond that needed for their desired career (see Table 14 and Figure 5). Marginal probabilities show that trades concentrators and non-concentrators, on the other hand, were slightly more likely to have aligned aspirations than college concentrators, and they were about as likely to be under-aligned as over-aligned. There were no interactions between trades concentrator status and grade level when predicting student aspirations.



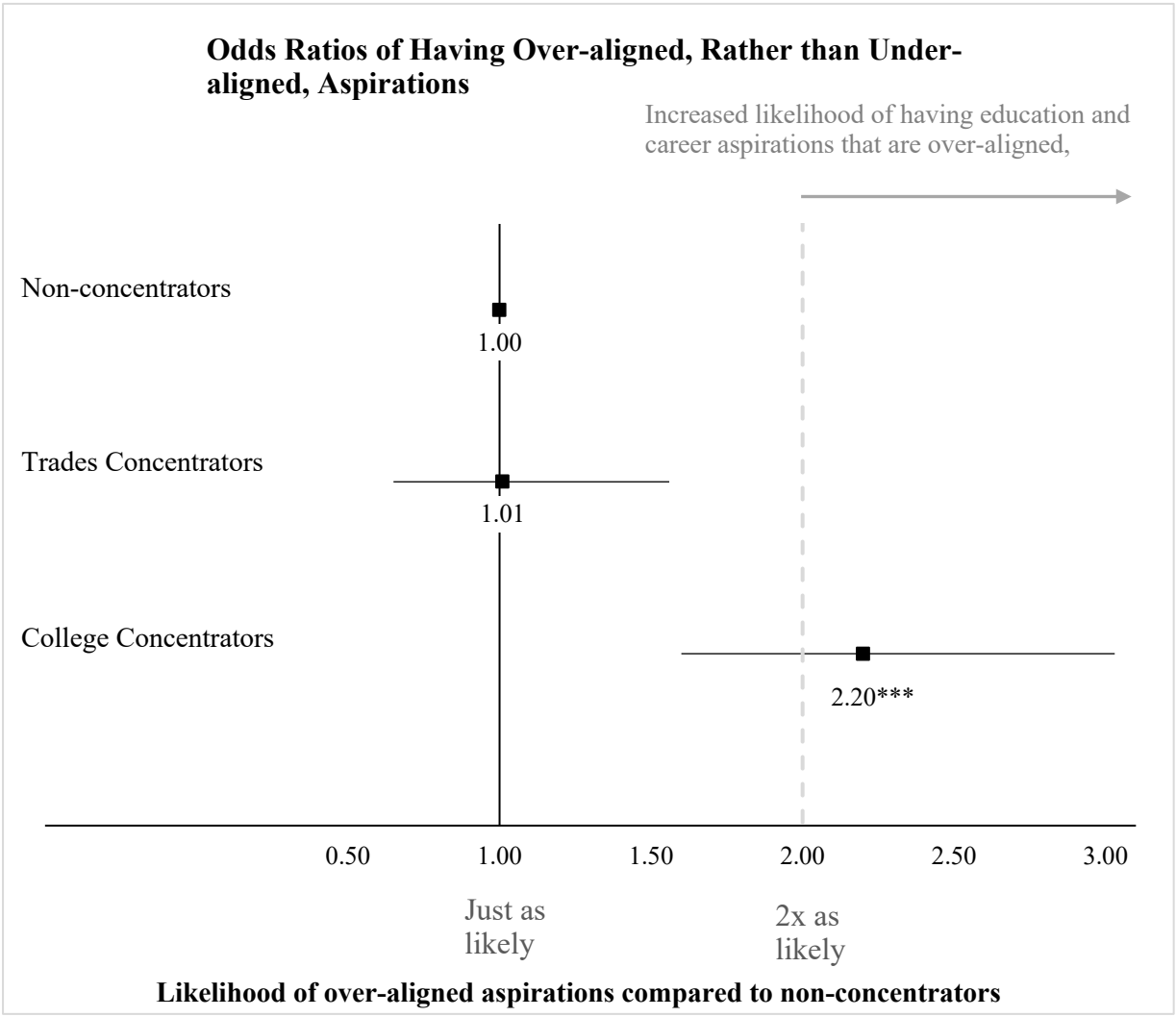

*** p<.001, ** p<.01, * p<.05

Figure 3: Odds Ratios of Having Higher, Rather Than Lower, Educational Aspirations Compared to Non-Concentrators, Controlling for Student Grade Level, Parent Education, Racial/Ethnic Identity, and Gender




*** p<.001, ** p<.01, * p<.05

Figure 4: Odds Ratios of Having Higher, Rather Than Lower, Career Aspirations Compared to Non-Concentrators, Controlling for Student Grade Level, Parent Education, Racial/Ethnic Identity, and Gender




*** p<.001, ** p<.01, * p<.05

Figure 5: Odds Ratios of Having Over-Aligned Aspirations Compared to Non-Concentrators, Controlling for Student Grade Level, Parent Education, Racial/Ethnic Identity, and Gender

The students also varied in their aspirations based on background characteristics. Students with higher parent education levels had higher educational aspirations, such that a one-year increase in either parent's education was associated with at least 15% higher odds of higher educational aspirations, as shown in Table 12. Table 13, however, shows that higher parent education did not predict the level of education required by the career the student aspired to. Therefore, as shown in Table 14, students who reported that their parents had higher levels of

education were more likely to have over-aligned aspirations and less likely to have under-aligned aspirations.

Parent expectations for college also predicted higher educational aspirations, with a one-unit increase in parent college expectations (on a scale from 1 to 6) predicting increased odds of 1.51 that a student has higher, rather than lower, educational aspirations (see Table 12). However, parent expectations for college did not significantly predict the level of education required by the career the student aspired to (Table 13). Therefore, while the models predicted that higher parent college expectations were associated with slightly over-aligned aspirations, these predictions were statistically insignificant (Table 14).

Male students had significantly lower educational aspirations than female students, with less than half the likelihood of aspiring to a BA or higher compared to a sub-baccalaureate credential, or of aspiring to a sub-baccalaureate credential compared to a high school diploma (Table 12). They also aspired to careers that required lower education levels than the careers to which female students aspired, although the difference was not statistically significant (Table 13). There was also no significant difference by student gender in the likelihood of over- or under-aligned occupational aspirations (Table 14). Finally, there were no differences in educational aspirations, career aspirations, or occupational alignment across student racial/ethnic identity groups.

**Predicting Vocational Development**

As shown in Tables 15 and 17, both vocational identity and self-reported career knowledge were higher for upperclassmen, with seniors showing vocational identities and self-reported career knowledge that are 0.28 and 0.36 standard deviations, respectively, higher than

those of freshmen. However, there was no difference in accuracy of salary estimates across grade levels (see Table 16).

Table 15: Regression Models Predicting Standardized Vocational Identity

| **Predicting vocational identity** | Basic model | | | Including parent expectations | | | Including trades concentrator x grade level | | |
|---|---|---|---|---|---|---|---|---|---|
| | Coef. | S.E. | Sig. | Coef. | S.E. | Sig. | Coef. | S.E. | Sig. |
| Non-concentrator | | | | | | | | | |
| Trades concentrator | 0.41 | 0.10 | *** | 0.42 | 0.10 | *** | 0.66 | 0.17 | *** |
| College concentrator | 0.44 | 0.07 | *** | 0.43 | 0.07 | *** | 0.51 | 0.08 | *** |
| Parent college expectations | | | | 0.02 | 0.07 | | | | |
| Grade 10 x Trades concentrator | | | | | | | -0.41 | 0.24 | |
| Grade 11 x Trades concentrator | | | | | | | -0.16 | 0.25 | |
| Grade 12 x Trades concentrator | | | | | | | -0.64 | 0.32 | * |
| Grade 10 | -0.07 | 0.08 | | -0.07 | 0.08 | | 0.01 | 0.10 | |
| Grade 11 | 0.14 | 0.09 | | 0.14 | 0.09 | | 0.16 | 0.10 | |
| Grade 12 | 0.28 | 0.09 | ** | 0.28 | 0.09 | ** | 0.30 | 0.11 | ** |
| Parent education | 0.00 | 0.01 | | 0.00 | 0.01 | | -0.01 | 0.01 | |
| Latino | -0.25 | 0.08 | ** | -0.26 | 0.08 | ** | -0.23 | 0.09 | * |
| Black | -0.10 | 0.15 | | -0.10 | 0.15 | | -0.23 | 0.16 | |
| Asian American | -0.45 | 0.22 | * | -0.45 | 0.22 | * | -0.58 | 0.23 | * |
| Male | 0.11 | 0.07 | | 0.11 | 0.07 | | 0.12 | 0.07 | |

*** p<.001, ** p<.01, * p<.05

Note: Models using college concentrators as the base group found that trades concentrators are not statistically significantly different from college concentrators in any of the models.

Table 16: Regression Models Predicting Standardized Salary Estimates

| **Predicting salary estimates** | Basic model | | | Including parent expectations | | | Including trades concentrator x grade level | | |
|---|---|---|---|---|---|---|---|---|---|
| | Coef. | S.E. | Sig. | Coef. | S.E. | Sig. | Coef. | S.E. | Sig. |
| Non-concentrator | | | | | | | | | |
| Trades concentrator | 0.07 | 0.11 | | 0.07 | 0.11 | | -0.08 | 0.17 | |
| College concentrator | -0.21 | 0.08 | ** | -0.24 | 0.08 | ** | -0.23 | 0.08 | ** |
| Parent college expectations | | | | 0.02 | 0.02 | | | | |
| Grade 10 x Trades concentrator | | | | | | | 0.20 | 0.25 | |
| Grade 11 x Trades concentrator | | | | | | | 0.21 | 0.26 | |
| Grade 12 x Trades concentrator | | | | | | | 0.64 | 0.33 | * |
| Grade 10 | 0.16 | 0.09 | | 0.16 | 0.09 | | 0.07 | 0.11 | |
| Grade 11 | 0.11 | 0.09 | | 0.11 | 0.10 | | 0.07 | 0.11 | |
| Grade 12 | -0.11 | 0.10 | | -0.11 | 0.09 | | -0.18 | 0.12 | |
| Parent education | -0.01 | 0.01 | | -0.01 | 0.01 | | -0.01 | 0.01 | |
| Latino | 0.02 | 0.09 | | 0.01 | 0.09 | | 0.00 | 0.09 | |
| Black | 0.05 | 0.15 | | 0.05 | 0.15 | | 0.07 | 0.16 | |
| Asian American | 0.14 | 0.23 | | 0.14 | 0.23 | | 0.23 | 0.25 | |
| Male | 0.28 | 0.07 | *** | 0.28 | 0.07 | *** | 0.25 | 0.08 | ** |

*** p<.001, ** p<.01, * p<.05

Note: Models using college concentrators as the base group found that trades concentrators had significantly higher scores than college concentrators in the first two models (basic model and model including parent expectations). In the model that includes interactions between trades concentrator and grade level, trades concentrator scores are not significantly different from those of college concentrators.

Table 17: Regression Models Predicting Standardized Self-Reported Career Knowledge

| **Predicting career knowledge** | Basic model | | | Including parent expectations | | | Including trades concentrator x grade level | | |
|---|---|---|---|---|---|---|---|---|---|
| | Coef. | S.E. | Sig. | Coef. | S.E. | Sig. | Coef. | S.E. | Sig. |
| Non-concentrator | | | | | | | | | |
| Trades concentrator | 0.41 | 0.11 | *** | 0.42 | 0.11 | *** | 0.47 | 0.18 | * |
| College concentrator | 0.44 | 0.07 | *** | 0.42 | 0.07 | *** | 0.45 | 0.08 | *** |
| Parent college expectations | | | | 0.03 | 0.02 | | | | |
| Grade 10 x Trades concentrator | | | | | | | -0.19 | 0.26 | |
| Grade 11 x Trades concentrator | | | | | | | 0.12 | 0.26 | |
| Grade 12 x Trades concentrator | | | | | | | -0.20 | 0.33 | |
| Grade 10 | -0.12 | 0.08 | | -0.13 | 0.09 | | -0.06 | 0.11 | |
| Grade 11 | 0.19 | 0.09 | | 0.19 | 0.09 | * | 0.23 | 0.11 | * |
| Grade 12 | 0.36 | 0.09 | *** | 0.36 | 0.09 | *** | 0.40 | 0.11 | *** |
| Parent education | 0.00 | 0.01 | | 0.00 | 0.01 | | 0.00 | 0.01 | |
| Latino | -0.19 | 0.09 | * | -0.20 | 0.09 | * | -0.20 | 0.09 | * |
| Black | 0.19 | 0.15 | | 0.18 | 0.15 | | 0.15 | 0.16 | |
| Asian American | -0.10 | 0.22 | | -0.09 | 0.22 | | -0.11 | 0.24 | |
| Male | 0.00 | 0.07 | | 0.00 | 0.07 | | 0.01 | 0.08 | |

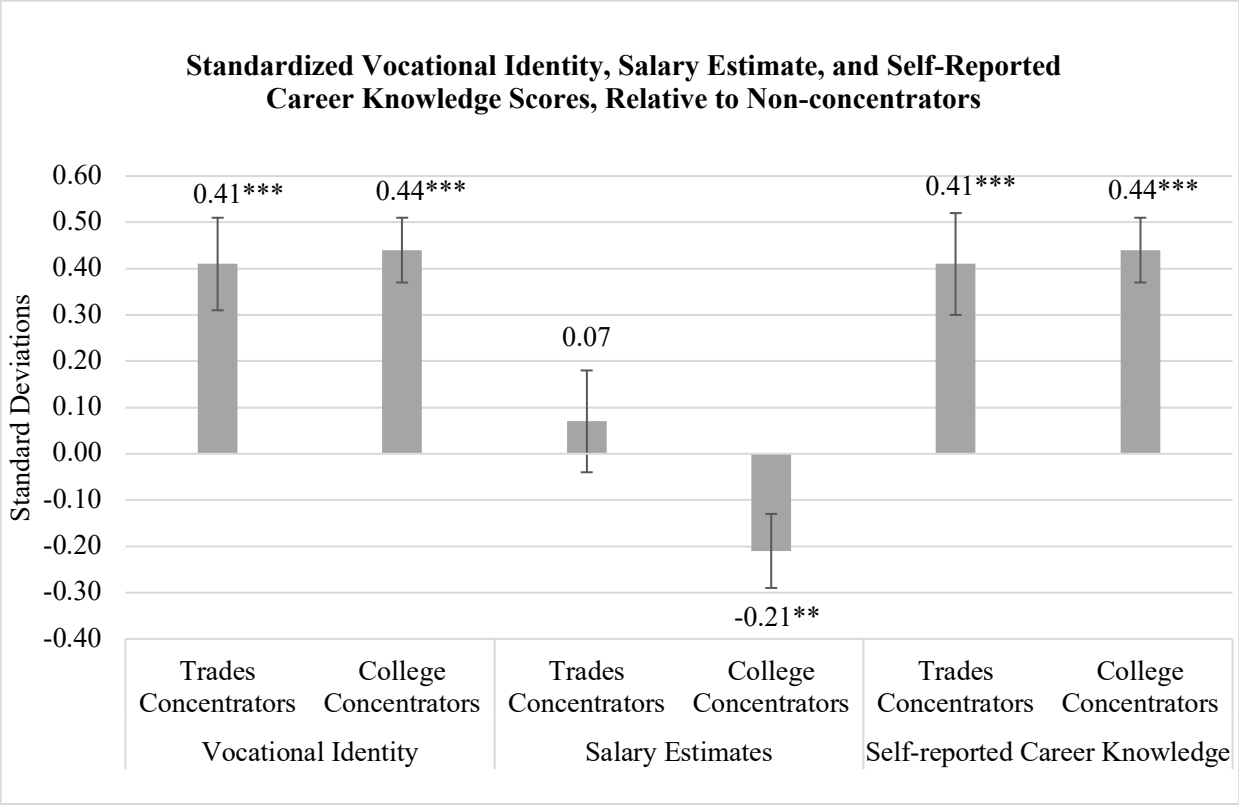
*** p<.001, ** p<.01, * p<.05

Note: Models using college concentrators as the base group found that trades concentrators are not statistically significantly different from college concentrators in any of the models.

Trades concentrators and college concentrators had stronger vocational identities than non-concentrators, with scores almost half a standard deviation higher, as shown in Table 15. The difference between trades concentrators and college concentrators was not statistically significant. The interactions in the third model of Table 15 show that trades concentrators had significantly smaller increases from grades 9 to 12 in vocational identity than non-concentrators,

but this was because the grade 9 trades concentrators had higher vocational identity scores than the grade 9 non-concentrators. In terms of salary estimates, college concentrators were significantly less likely to overestimate the salaries at various education levels than non-concentrators and trades concentrators (see Table 16). Trades concentrators' estimates were not significantly different from those of non-concentrators, except for in grade 12, where senior trades concentrators overestimated the average salaries of various education levels by over a third of a standard deviation higher than non-concentrators. Trades concentrators and college concentrators reported higher levels of knowledge about their chosen career than non-concentrators by almost half a standard deviation, as shown in Table 17. Trades concentrators and college concentrators were not significantly different from each other on this outcome, and there were no interactions between trades concentrator status and grade level. Figure 6 graphs the estimates from the basic models to show how trades concentrators and college concentrators compared to non-concentrators in vocational identity, salary estimates, and self-reported career knowledge, controlling for student covariates.

Somewhat surprisingly, neither parent education nor parent college expectations significantly predicted vocational identity, salary estimates, or self-reported career knowledge. Male students were much more likely than female students to overestimate the median salaries for various education levels, scoring over a quarter of a standard deviation higher, as shown in Table 16. However, if we assume their salary estimates were based on what they themselves anticipate being able to earn, male student estimations were actually quite accurate, since men who work full-time, year-round earn about 23% more than women with similar educational attainment (Carnevale et al., 2011). Examining male student salary estimates more closely




*** p<.001, ** p<.01, * p<.05

Figure 6: Standardized vocational identity, salary estimate, and self-reported career knowledge scores of trades concentrators and college concentrators, compared to those of non-concentrators, controlling for student grade level, parent education, racial/ethnic identity, and gender

reveals that their estimations for workers with high school diplomas were accurate for male workers, and their estimations were only slightly too high for male workers with associate degrees. For the earnings of workers with bachelors and advanced degrees, male students estimated well under what men with those degrees can expect to earn. Female student salary estimates were closer to median earnings for each degree level, but higher than what women at each degree level typically earn.

Male and female students did not differ in terms of vocational identity or self-reported career knowledge, all else equal. Latino students had vocational identity scores about a quarter of a standard deviation lower than those of white students, and Asian American students scored

almost half a standard deviation lower than white students on vocational identity (Table 15). Although they scored similarly to white students in terms of salary estimates, Latino students reported levels of knowledge about their chosen occupations that were about a fifth of a standard deviation lower than the self-reports of white students (Table 17).

**Marginal Mean Weighting with Stratification Estimates**

Table 18 displays the results of the propensity score model predicting status as a trades concentrator instead of a college concentrator, as well as the propensity score model predicting status as a trades concentrator instead of a non-concentrator. Two separate propensity score models were run, as opposed to a multinomial logistic regression with a 3-category outcome, because some trades concentrators had their counterparts in one comparison group (college concentrator or non-concentrator), but not the other. The estimates displayed are those obtained from only the first imputation of each model.

Table 18: Propensity Score Models Predicting Status as a Trades Concentrator Versus College Concentrator or Non-concentrator

| **Predicting concentrator status** | **Trades concentrator vs. college concentrator** | | | **Trades concentrator vs. non-concentrator** | | |
|---|---|---|---|---|---|---|
| | Coef. | S.E. | Sig. | Coef. | S.E. | Sig. |
| Racial/ethnic identity (white omitted) | | | | | | |
| Latino | -0.40 | 0.49 | | -0.22 | 0.49 | |
| Black | -0.73 | 0.92 | | -0.39 | 0.80 | |
| Asian American | -0.42 | 0.95 | | -0.29 | 0.97 | |
| Male | 3.55 | 0.44 | *** | 3.38 | 0.42 | *** |
| Free/reduced-price lunch status | -0.85 | 0.42 | * | -1.22 | 0.44 | ** |
| Parent education | -0.09 | 0.04 | * | -0.13 | 0.04 | ** |
| Grade level (Grade 9 omitted) | | | | | | |
| Grade 10 | -0.82 | 0.52 | | -0.70 | 0.52 | |
| Grade 11 | -1.01 | 0.54 | | -0.98 | 0.51 | |
| Grade 12 | -1.62 | 0.73 | * | -2.05 | 0.77 | ** |

Table 18, continued

| **Predicting concentrator status** | **Trades concentrator vs. college concentrator** | | | **Trades concentrator vs. non-concentrator** | | |
|---|---|---|---|---|---|---|
| | Coef. | S.E. | Sig. | Coef. | S.E. | Sig. |
| Subjective family finances (1 – "Often not enough to meet basic expenses" omitted) | | | | | | |
| 2 - Just meets basic expenses | -2.40 | 1.98 | | -2.21 | 1.83 | |
| 3 - Meets needs with a little left | -1.05 | 1.86 | | -1.12 | 1.69 | |
| 4 – Lives comfortably | -1.50 | 1.74 | | -1.38 | 1.54 | |
| Grade level x subjective family finances | | | | | | |
| Grade 10 x 2 | -0.48 | 1.52 | | -1.12 | 1.39 | |
| Grade 10 x 3 | -0.75 | 1.02 | | -0.36 | 0.98 | |
| Grade 10 x 4 | (empty) | | | (empty) | | |
| Grade 11 x 2 | -0.41 | 1.34 | | -0.10 | 1.31 | |
| Grade 11 x 3 | 0.13 | 0.96 | | 0.23 | 0.94 | |
| Grade 11 x 4 | (empty) | | | (empty) | | |
| Grade 12 x 2 | -0.34 | 1.68 | | 0.92 | 1.66 | |
| Grade 12 x 3 | 0.15 | 1.21 | | 0.85 | 1.16 | |
| Grade 12 x 4 | (empty) | | | (empty) | | |
| GPA | -1.59 | 0.25 | *** | -1.43 | 0.24 | *** |
| Pseudo-R | 0.50 | | | 0.48 | | |

*** p<.001, ** p<.01, * p<.05

When estimating MMWS weights, I stratified the logit propensity scores into 10 strata using a caliper of 0.2 of the standard deviation of the logit propensity score for estimating the weights for each comparison (trades concentrator compared to college concentrator and trades concentrator compared to non-concentrator).

Table 19 displays the balance statistics after applying MMWS weights. Balance was checked by applying a global F test of between-group mean difference in each logit propensity score. To check the balance on the covariates used to estimate the propensity score models, I used a combination of F tests and Wald tests, depending on the variable type. The balance statistics show that the MMWS weighting effectively reduced the differences between treatment groups (trades concentrator vs. college concentrator and trades concentrator vs non-

concentrator), such that differences in logit propensity scores and covariates are no longer significant in the weighted samples. Therefore, the analysis using weighted groups approximates

Table 19: Balance Statistics Displaying Test Results of Mean Difference Between Comparison Groups Before and After Weighting

| | **Trades concentrator vs. college concentrator** | | **Trades concentrator vs. non-concentrator** | |
|---|---|---|---|---|
| **Balance check** | Before weighting | After weighting | Before weighting | After weighting |
| Logit propensity score | 265.10 *** | 0.08 | 90.50 *** | 0.06 |
| Male | 62.11 *** | 0.35 | 37.93 *** | 0.00 |
| White | 2.70 | 0.53 | 5.44 * | 0.94 |
| Latino | 1.72 | 1.02 | 5.74 * | 1.44 |
| Black | 0.34 | 0.01 | 0.60 | 0.00 |
| Asian American | 0.34 | 0.62 | 0.77 | 0.01 |
| Grade 9 | 3.34 | 0.00 | 0.98 | 0.58 |
| Grade 10 | 0.02 | 0.39 | 0.01 | 0.11 |
| Grade 11 | 1.93 | 0.00 | 1.25 | 0.00 |
| Grade 12 | 0.05 | 0.93 | 0.01 | 3.45 |
| Free/reduced-price lunch | 0.74 | 1.56 | 5.92 * | 0.22 |
| Parent education | 14.42 *** | 0.37 | 0.06 | 1.91 |
| GPA | 95.77 | 0.32 | 0.62 | 0.66 |
| Subjective family finances | 0.45 | 0.32 | 3.22 | 0.35 |

*** p<.001, ** p<.01, * p<.05

randomization, such that the treatment effect estimates resemble what we would have observed if students had been randomly assigned to trades concentrator status. However, it is important to keep in mind that the groups may still differ in the distribution of unobserved covariates even after weighting.

Estimates from weighted outcome models to estimate the impact of being a trades concentrator instead of a college concentrator are displayed in Table 20. Trades concentrators had substantially lower postsecondary educational aspirations compared to college concentrators, but just slightly lower career aspirations. As a result, they were less likely to have over-aligned

educational aspirations and more likely to have under-aligned aspirations. These findings accord with estimates from the regression models.

Table 20: MMWS-weighted ANOVA Models Predicting Outcomes for Trades Concentrators Compared to College Concentrators

| **Trades concentrators vs. college concentrators** | **Average treatment effect on the treated** | | |
|---|---|---|---|
| | Difference of Means | S.E. | Sig. |
| Postsecondary aspirations | -0.73 | 0.01 | *** |
| Career aspirations | -0.19 | 0.02 | *** |
| Occupational alignment | -0.85 | 0.02 | *** |
| Vocational identity | 0.05 | 0.01 | *** |
| Salary estimates | 0.39 | 0.01 | *** |
| Career knowledge | 0.00 | 0.01 | |

*** p<.001, ** p<.01, * p<.05

Table 20 also shows that trades concentrators had somewhat higher vocational identity scores than similar college concentrators. This finding stands in contrast to the regression models, which found that the difference in vocational identity between trades concentrators and college concentrators was not significant. This discrepancy suggests that students who became college concentrators would have developed stronger vocational identities if they had become trades concentrators instead.

Finally, Table 20 shows that trades concentrators were significantly more likely than college concentrators to overestimate the salaries earned with various postsecondary degrees, and they scored similarly to college concentrators on self-reported career knowledge. These findings are similar to those displayed in the regression tables.

Estimates of the impact of being a trades concentrator instead of a non-concentrator are displayed in Table 21. Trades concentrators had significantly lower postsecondary educational

aspirations than non-concentrators, while their career aspirations were similar. As a result, trades concentrators were less likely than non-concentrators to have over-aligned aspirations and more likely to have under-aligned aspirations. These results differ from those found by the regression models, which showed that trades concentrators had similar postsecondary aspirations and occupational alignment scores as non-concentrators. In turn, we can conclude that, hypothetically, trades concentrators would have developed higher educational aspirations if they had become non-concentrators instead. They would also have been slightly less likely to have under-aligned postsecondary aspirations and slightly more likely to have over-aligned ambitions.

Table 21: MMWS-weighted ANOVA Models Predicting Outcomes for Trades Concentrators Compared to Non-concentrators

| **Trades concentrators vs. non-concentrators** | **Average treatment effect on the treated** | | |
|---|---|---|---|
| | Difference of means | S.E. | Sig. |
| Postsecondary aspirations | -0.16 | 0.01 | *** |
| Career aspirations | -0.03 | 0.02 | |
| Occupational alignment | -0.09 | 0.02 | *** |
| Vocational identity | 0.31 | 0.01 | *** |
| Salary estimates | 0.18 | 0.01 | *** |
| Career knowledge | 0.36 | 0.01 | *** |

*** p<.001, ** p<.01, * p<.05

Table 21 also shows that trades concentrators had higher vocational identity scores and self-reported career knowledge than non-concentrators, as also found by regression models. However, trades concentrators were more likely than non-concentrators to overestimate the median salaries for various postsecondary degrees, in contrast to regression models that showed no difference in estimates between these groups. As a result, we can conclude that hypothetical

assignment to trades concentrator status over non-concentrator status would result in less accurate salary estimations.

**Limitations**

The major limitation of these analyses is that they do not justify causal claims about the impact of CTE participation on the outcomes being measured. The CTE participants were not a random group. While the regression and MMWS models control for likely confounders, including student gender and parent education levels, both types of analyses rely on the assumption that all confounders are included in the models. It could be that the students who selected into CTE shared unobserved characteristics that shaped their scores on the outcomes measured, biasing our estimates.

As mentioned earlier, the analyses are based on data with a great deal of missingness. Missing data were imputed to reduce bias from this missingness, but these procedures assume that data is MAR. There is some reason to think that the missing data for grade 12 were not MAR, as some seniors with higher-than-average GPAs were permitted to leave school at the time the survey was administered, and GPA predicted student outcomes on a number of measures. In turn, findings on seniors, particularly those most likely to be categorized as "college concentrators," may not represent the true OHS population.

Finally, the analytic models do not account for the nested structure of the data. Students are grouped into classes that could exert unique influences on the outcomes measured (for example, if one welding teacher is particularly strong at providing information about career opportunities), and accounting for this grouping is necessary to ensure accurate standard errors and confidence intervals. Unfortunately, data on student class assignment were not available.

While this does not affect estimates of outcomes, it could mean that standard errors are biased. To help reduce this bias, I have reported robust standard errors.

**Chapter 5 Discussion**

Education researchers have expressed concern that, despite the CTE policy goals of preparing students for both college and careers, CTE participation in comprehensive high schools could reify within-school segregation of "college-bound" and "vocational" students and reproduce stratification in preparation for high-status careers (Hodge et al., 2020). These concerns stem, in part, from causal research that has found lower rates of four-year college-going among CTE concentrators, especially those in manufacturing and construction (Brunner et al., 2019; Cowan et al., 2019; Dietrich et al., 2016; Dougherty, 2018a; Giani, 2019; National Center for Education Statistics, 2020a; Witzen, 2019). The current chapter helps address questions about the extent to which lower rates of college-going among CTE concentrators in traditional vocational fields are associated with financial, institutional, informational, or academic constraints that prevent students from achieving their goals, versus well-formed aspirations for careers that do not require advanced levels of higher education.

Descriptive data about students at OHS show that CTE trades concentrators were different from other students, but they were not disproportionately members of marginalized ethnic/racial or socioeconomic groups. Compared to college concentrators and the OHS student body as a whole, trades concentrators were more likely to be white, and their rate of participation in the FRPL program was lower than that of the overall OHS student body. However, trades concentrators were lower-achieving than college concentrators, they valued school less, and they were much more likely to be male. These results suggest that CTE in the trades provided

coursework and resources for students – particularly boys – who had low motivation to attend college. This accords with what many educators envisioned to be the function of CTE.

Some might argue that time spent participating in trades courses distances trades concentrators from their higher-achieving, higher-income peers. College concentrators reported higher parental education levels and lower participation in FRPL than trades concentrators or any other group, suggesting not only higher socioeconomic status but also greater access within their family networks to knowledge about college and the process of preparing for and applying for bachelor's and advanced degree programs. Because they concentrated in CTE coursework, trades concentrators may have spent less time in classes with college concentrators and therefore had reduced access to their cultural capital regarding college knowledge and preparation (Hoxby and Avery 2012). In other words, CTE coursework in the trades could have reinforced low college expectations and aspirations among students who already had low academic motivation, limiting opportunities for trades concentrators to become more college-oriented.

However, the descriptive data suggest that, in the absence of CTE coursework, many trades concentrators likely would not have pursued honors and AP coursework alongside college concentrators. If we assume they would have had experiences like those of their peers with similar academic achievement and levels of school valuing, they would have pursued neither college preparation courses and activities nor trades knowledge and skills. Non-concentrators were similar to trades concentrators in terms of GPA and feelings about the value of school, and they reported comparable parent education levels. However, they were much more likely to participate in the FRPL program than either college concentrators or trades concentrators, and as a group they included a higher proportion of Latino students and a lower proportion of white students than either of the other groups. These findings imply that the most disadvantaged

students – those who were disproportionately low-income and racial/ethnic minority, in addition to having low academic achievement and parents with lower levels of education – were not tracked into CTE. Instead, they participated in neither extensive college preparation nor preparation for sub-baccalaureate careers, missing out on the potential benefits of both.

Looking more granularly at how trades concentrators, college concentrators, and non-concentrators differed helps to explain the extent to which their dissimilarities in aspirations were based on accurate information about and commitment to a specific postsecondary pathway. Regression and MMWS analyses of educational aspirations shows that, all else being equal, both trades concentrators and non-concentrators had low educational aspirations compared to college concentrators. However, regression models show that both groups showed increases in educational aspirations across grade levels, similar to the increases seen in college concentrators. We can interpret this as meaning 1) earlier (more senior) cohorts were exposed to unobserved influences that increased their educational aspirations relative to later cohorts, and these influences affected non-concentrators, trades concentrators, and college concentrators similarly; 2) educational aspirations grew at similar rates across groups as they progressed in grade level; or 3) students may begin as college concentrators in grade 9 but become CTE concentrators or non-concentrators over time due to declining educational aspirations, raising the average aspirations of remaining college concentrators as well as the non-concentrator and trades concentrator groups. None of these scenarios supports the view that participation in traditional vocational CTE itself decreases students' educational aspirations. Instead, it appears to be the case that students who already had lower than average educational aspirations were more likely to select into becoming trades concentrators. Because the models control for parent education

levels, it is unlikely that the lower aspirations among CTE concentrators were due to perceptions of financial constraint.

These findings challenge the view that CTE students who do not enroll in four-year colleges have failed to meet their educational aspirations. Instead, it appears that many students did not find the prospect of attaining a BA appealing or necessary for meeting their long-term goals. But how informed were these students about the costs and benefits of attaining a four-year degree as they developed their aspirations? If students believed that they needed sub-baccalaureate education levels but had expectations for careers or salaries that actually require advanced degrees, we would conclude that their educational goals were unrealistic. Data on student occupational alignment, salary estimates, and self-reported career knowledge can shed light on whether students with low educational aspirations were setting long-term goals in an informed way or, rather, in a way that was short-sighted or misinformed.

Regression and MMWS results on occupational alignment suggest that non-concentrators and trades concentrators were more likely than college concentrators to aspire to levels of education that were appropriate for their desired careers. College concentrators, on the other hand, were highly likely to aspire to levels of education beyond that which would be necessary to attain their desired careers. This finding supports the Oaksburg educators' concerns that many students pursued higher educational degrees without regard to the most efficient pathway toward the career of their choice, potentially contributing to burdensome student loans and degree inflation. That said, it is unclear whether students with over-aligned aspirations were unaware of the level of education necessary for their career goals. It could be the case that these students intentionally aspired for more education than necessary as a sort of insurance in case their initial career goal changed or did not work out. Additionally, while trades concentrators and non-

concentrators appear to have had the most aligned aspirations overall, they were more likely than college concentrators to have under-aligned ambitions, with trades concentrators more likely than any other group to underestimate the education needed for their career goals. Both types of misalignment have been shown to have negative consequences for the achievement of long-term career goals (Croll, 2008; Rennison et al., 2005; Sabates et al., 2011; Schneider & Stevenson, 1999), but under-alignment has been found to have the most costly impact (Sabates et al., 2011).

Along with college concentrators, trades concentrators had high vocational identity scores that grew across grade levels, indicating clarity and stability of career goals and interests (Holland, Johnston, & Asama, 1993). These traits predict strong self-efficacy and long-term achievement of occupational goals (Brown, 1999; Coertse & Schepers, 2004; Savickas, 1993). MMWS models showed that, when comparing students with similar achievement levels, trades concentrators were more likely than any other group to display high vocational identity. Vocational identity was especially strong among grade 9 trades concentrators compared to their non-concentrator and college concentrator peers, further supporting the view that trades concentrator postsecondary aspirations were at least in part the result of pre-existing career goals. Non-concentrators, on the other hand, had relatively low vocational identity scores. The uncertainty about occupational goals and low self-efficacy represented by low vocational identity has been found to predict lower educational and occupational outcomes (Sabates et al., 2011).

Trades concentrators and non-concentrators were more likely than college concentrators to overestimate the median salaries earned at various levels of education, suggesting that their relatively low educational aspirations may have reflected unrealistic expectations about what they could earn with sub-baccalaureate credentials or high school diplomas. Of all the groups, trades concentrators had the most inaccurate salary perceptions, primarily due to overestimations

of earnings for workers with sub-baccalaureate degrees. It is relevant that, for many careers in the trades, especially in manufacturing, median salaries are indeed higher than typical salaries at sub-baccalaureate levels of education (Levinson, 2019). However, overall, trades concentrators estimated that workers with education levels below a BA earned much more than they actually do, even if comparing their estimates only to workers in manufacturing. This is perhaps not surprising, given the findings shared in Chapters 3 and 4 about Oaksburg education leaders' hyperbole about the long-term earnings of local sub-baccalaureate careers.

Despite their inaccurate salary estimations, trades concentrators at all grade levels reported having high levels of knowledge about their chosen occupation's routine activities, required skills, promotion opportunities, and working conditions. College concentrators had similarly high self-ratings for their career knowledge. This suggests that students in these groups had sufficient educational and vocational experiences to feel confident in their educational and occupational choices, which is unsurprising considering both groups' similarly high scores on vocational identity. Non-concentrators, who had lower average vocational identity scores, also reported lower levels of knowledge about their chosen careers.

Overall, the results for vocational development – as measured by occupational alignment, vocational identity, salary estimates, and self-reported career knowledge –support the view that college concentrators' educational aspirations were based on considerable knowledge about careers and commitment to a specific career pathway, while trades concentrators typically felt strongly committed to a career pathway and confident that they had sufficient knowledge to pursue it, despite having less accurate knowledge about typical salaries. Non-concentrators, on the other hand, felt neither committed to nor knowledgeable about a specific career pathway.

The results on trades concentrators echo the findings of Bozick and DeLuca regarding their "work-driven non-enrollees," who set lower educational aspirations than their peers not due to greater financial constraint, but because they felt higher education would not contribute to acquiring their preferred careers. Similar positive perceptions of sub-baccalaureate career opportunities may have shaped the aspirations of trades concentrators in the current study. Their educational aspirations were reasonably well-aligned with their career aspirations, and they felt confident that they had sufficient knowledge to make an informed commitment to a specific career pathway. However, the finding that trades concentrators overestimated sub-baccalaureate degree salaries show that their self-reported knowledge about the career pathways was not entirely accurate. Instead, trades concentrators may have had unrealistic ideas about their long-term career prospects via CTE pathways. This finding raises the question of whether some of the trades concentrators who chose not to pursue BAs would have had higher aspirations if they had acquired more accurate information.

Most concerning are the findings regarding non-concentrators. As pointed out earlier, these students missed out on the rigorous academic preparation and college credentials earned by college concentrators, as well as the marketable occupational skills and industry credentials earned by trades concentrators. With low educational aspirations and low vocational development, they were more vulnerable than other groups to dropping out of higher education, experiencing periods of unemployment, and attaining low wages (Sabates et al., 2011; Staff et al., 2010). In many ways, these non-concentrators are similar to the group referred to by Deil-Amen and DeLuca (2010) as an "educational underclass" that is most vulnerable to poor postsecondary outcomes.

Also of note are the differences in aspirations and vocational development across demographic groups. Male students in this study had much lower educational aspirations than female students, as has been found in a number of other studies (e.g., Chenoweth & Galliher, 2004; Elder & Conger, 2000; Meece et al., 2013). Latino and Asian American students, despite having aspirations as high as those of other ethnic groups, had lower scores on vocational identity, indicating lower confidence in their current career goals. This result accords with the findings of Boyd and colleagues (2003), Lucas and Berkel (2005), and Morales (1996). Additionally, Latino students reported lower levels of knowledge about their chosen careers. Future research should examine individual, family, and community contexts that may influence differential vocational development across ethnic and racial groups.

Students who reported having parents with higher educational levels had higher educational aspirations, as did students who perceived their parents as having high expectations for college. This finding is consistent with prior literature (e.g., Kahl, 1953; Meece et al., 2014; Oymak, 2018; Sewell et al., 1969). Interestingly, however, students with higher parent education and parent college expectations did not show interest in careers that required significantly higher levels of education than the career interests of other students. As a result, students whose parents had higher levels of education in particular were more likely to have aspirations that were over-aligned, as was also found by Meece and colleagues (2013). This finding supports the Oaksburg educators' views that college-educated parents were more likely to push a CFA point of view, regardless of their children's actual career goals.

**Conclusion**

Despite massive shifts in how educational stakeholders across the United States are thinking about postsecondary success, most sociological literature still operates under CFA

assumptions about student aspirations. Findings in this chapter help to scratch the surface of student goal-setting in a context in which four-year college alternatives are promoted and considered honorable. Many of the trades concentrators at OHS appear to have selected into CTE because of their pre-existing goal of attaining a career that would not require a four-year degree. It does not seem to be the case that CTE participation caused or exacerbated low educational aspirations for most trades concentrators; and as a group, they were strong in occupational alignment, vocational identity, and self-reported career knowledge, all outcomes that suggest that their aspirations were appropriate for their career goals. However, they had the least accurate knowledge of any group of the median salaries for various educational degrees. Based on these findings, we are left, frustratingly, without strong conclusions about the extent to which CTE students' lower rates of college-going reflect agency in decision-making and career maturity.

Yet, it is important to recognize that, without CTE coursework, trades concentrators may have more closely resembled their non-concentrator peers than the college concentrators with such strong vocational development. Like trades concentrators, non-concentrators had relatively low academic performance and placed little value on what they learned in school. But unlike trades concentrators, they had low career information and weak vocational identities, indicating that their low educational and career aspirations were likely due to a lack of exposure to and exploration of various postsecondary options. This suggests that CTE coursework participation reinforced, or, at the very least, did not detract from students' vocational development.

In thinking about the implications of these findings for OHS and similar schools, it is noteworthy that the Oaksburg educators' goal of providing CTE that delivers college alternatives to students with low college motivation was realized for those who actually concentrated in CTE. However, the majority of students with low academic motivation and low achievement,

especially those who were economically disadvantaged and/or ethnic minority, were neither trades concentrators nor college concentrators. It was the students with higher economic standing, who were disproportionately white, who were capitalizing on the opportunities CTE could provide. The trades concentrators were also disproportionately male. This is an expected finding, since most trades concentrators nationally are boys. Additionally, two-thirds of OHS students with sub-baccalaureate aspirations were male, suggesting that male students were most in need of college-prep alternatives. Nevertheless, there existed a sizable number of female students – almost 1 in 5 OHS girls – who aspired to a level of education below a BA. Because the girls were not likely to consider the trades concentrator pathway as appealing or realistic for themselves, they lacked an equivalent alternative to the college concentrator and non-concentrator statuses that the boys experienced.

Many current discussions about CTE's implications for educational equity center on concerns about whether CTE students have sufficient preparation to succeed in college. However, as vocational education scholars have pointed out, it may be the non-concentrator group who face the most dire inequities (Deil-Amen & DeLuca, 2010; Gray & Herr, 1995; Laird et al., 2006). At risk of needing remedial college coursework and dropping out of college altogether, with little marketable human capital to fall back on, these students stand to gain the most from OHS's plans to continue expanding the amount and type of CTE resources they offer. Nationwide, students questioning whether traditional college pathways will help them achieve their goals may benefit similarly.

# CONCLUSION

Through the lens of CTE, this dissertation has revealed influences on and consequences of evolving ideals about the goals of education, as envisioned by school leaders, community members, and students themselves. As schools increasingly move away from CFA ideals that predicate postsecondary success on BA completion, CTE has become a major arena for the reconceptualization of educational equity. The findings have shown how this reconceptualization process is fundamentally shaped not only by how policymakers articulate what equitable outcomes should look like, but also by collective and dynamic sensemaking at the local level between educators, employers, and other and educational stakeholders about the particular constraints and opportunities that characterize the community's postsecondary landscape.

In Oaksburg, we see that CTE program design was shaped heavily by faith that middle-skill career preparation, especially preparation for careers in the manufacturing industry so vital to the local economy, would provide attainable pathways toward the middle-class lifestyles that previous cohorts of students had failed to attain. Survey findings presented in Chapter 5 support the view that these programs offered valuable career exploration and learning opportunities to many students who otherwise may have experienced little preparation for postsecondary education or work. However, in their eagerness to provide students with four-year college alternatives, educators appear to have developed beliefs about the occupational hierarchy that were unrealistically egalitarian. Their underestimations of how stratified incomes are, on average, across careers requiring sub-baccalaureate versus bachelor's and advanced degrees have, in turn, misled CTE students about how much they can expect to earn without four-year degrees.

In Chapter 1, I made the case that any assessment of educational programs' success should integrate students' own understandings of how well such programs have supported their personal aspirations. To decipher the consequences of Oaksburg CTE for student outcomes, I talked with more than 160 young adults and OHS students over the course of this project. Through interviews and focus groups, I asked them about their goals and how they made decisions about life after high school. The current chapter is not a formal analysis of the findings from these conversations, but I draw on select examples to complement survey results, illustrating some of the ways in which CTE participation, or lack of participation, influences students' ability to achieve the goals they set for themselves.

I spoke with one young man, whom I call "Nate," on the cusp of his graduation from high school and again a few months later at the outset of his apprenticeship in advanced manufacturing. Unlike most of the high school trades concentrators in this study, Nate was previously an honors student and a "college concentrator." Until 10th grade, he had planned on attending a four-year college and majoring in mechanical engineering. While this plan reflected his lifelong love of working with his hands to build and repair in innovative ways, he described the prospect of a mechanical engineering major as a default option, rather than something he was passionate about. He explained that, during a goal-setting exercise in ninth grade, "I was sitting there like, 'Do I really wanna set my goal to be a mechanical engineer?' And there was just nothing else that came to mind to what I wanted to do." It was not until CTE teachers in the 10th grade noticed Nate's passion for creating and tinkering in his free time. Explaining that "college isn't for everyone," they encouraged him to explore coursework and careers in the trades. Nate explained,

> … I started getting the exposure and all these things you don't even need college for. And that's, everything started to shift to "why pay for college and then have

> debt that I won't be able to pay off 'til I'm like 60 for that job?" to now, I'm out of high school, making money, trying to buy a house, and I don't even have to pay for college debt.

Inspired by the prospect of working immediately after high school in a field that he loved, Nate became a CTE concentrator in welding. During his senior year, he dropped three courses – including an AP math course and a literature course – in order to pursue a time-intensive pre-apprenticeship program.

Nate's father, who worked in the trades himself, was very supportive of his plan. While his mother was initially hesitant about Nate dropping college-prep courses, she came around once she learned more about the career options available in the manufacturing field. Nate's decision to become a pre-apprentice was also met with encouragement from his CTE and academic teachers alike: "Every single one of my teachers were completely supportive. And especially whenever I told them, 'I'm dropping your class,' they said, 'Go for it.'" When I spoke separately with the college counselor and observed meetings with teachers from Nate's high school, they explained that they were heartened to see high-achieving students like Nate participate in the CTE program, particularly in the trades. It demonstrated to other students that pursuing a career in the trades was "not a lesser pathway," but rather a respectable option for intelligent people with a passion for the work.

When I talked to Nate after his transition into an apprentice role at the same company where he completed his pre-apprenticeship, he explained that all his plans were falling into place. For him, success meant "being able to buy a house and support a family. And from the way it looks, I'll have a house before I'm 20." Like many of the young people I spoke with, Nate's visions of the future centered around the ability to achieve traditional adult milestones such as home ownership and family formation. These goals felt threatened by the prospect of student

debt, which, Nate and others were told, had contributed to the unmet expectations of so many in the generation before them.

However, Nate's estimation of how long it would have taken for him to pay off student loans as a mechanical engineer was exceedingly off-base. As a machinist and welder, Nate is set to earn approximately half of what he would have earned annually as a mechanical engineer, and a similar salary gap exists between management positions in these fields. It seems likely that the warnings Nate received at school about student debt and underemployment, combined with having few personal role models who worked in careers requiring a BA, had given him an inaccurate and short-sighted picture of his own education and career options. In this way, Nate is similar to the CTE concentrators at OHS, who had misunderstandings about how sub-baccalaureate degree median earnings compared with those of bachelor's and advanced degrees. On the other hand, Nate is happy with his current position and the lifestyle stability it provides him. He takes pride in the fact that he is debt-free and able to provide for himself, and he looks forward to moving up in the company where he currently works. Where he currently stands, Nate believes that CTE has been key to unlocking a future that aligns with his personal aspirations. It is impossible to say whether he will always feel that changing his trajectory from engineering to machining and welding was the right choice.

The idea that CTE may reduce the long-term educational and career potential of students like Nate is in many ways an affront to long-standing American conceptions of educational opportunity. However, as CTE advocates have pointed out, a singular focus on making the highest levels of achievement a possibility for all students often comes at the expense of support for the vast numbers who do not ascend to the top of the occupational hierarchy (Newman & Winston, 2016; Symonds et al., 2011). Unlike Nate, most of the young adults I spoke with did

not have access to CTE in high school. I came across 20 of these young people (18 white men and 2 white women), while touring apprenticeship programs in construction, manufacturing, HVAC, and other trades. Most had attended local high schools three or more years earlier, before the coordinated transition from CFA to more expansive institutionalized paradigms of postsecondary success. They had found their way into apprenticeships along varying paths, but high school CTE had not been one of them.

In many ways, these apprentices shared characteristics with both the non-concentrators and trades concentrators described in Chapter 5. Few described themselves as having been academically engaged students in high school, and most (16 of the 20) had earned low grades in their academic classes. Some described feeling early on that the prospect of attending a four-year college was incredibly unappealing. One apprentice described having this feeling in eighth grade: "I knew right away I wasn't going to go to college. That kind of stuff just wasn't for me … I hated writing essays and stuff. I knew paperwork just isn't my thing. So, I skated by." Another apprentice explained his reaction to learning about some of the academic expectations of college: "In 11th grade, my history teacher was like, 'Yeah, in college I was writing a small paper, like seven pages.' I'm like, 'You're out of your mind.'"

In addition to its off-putting academic expectations, college also posed a financial risk that had made the apprentices wary: "I get why they have you do college at the stage of life you are. But at 18 years old, that is a very big commitment to be making. Say, on average, even if it was 10 grand a year, you're making a $40,000 commitment at 18 years old. With no job." They described seeing friends take on student loans, only to drop out before finishing their degrees. One explained, "I've checked it. I've visited colleges. I just wasn't interested. Also didn't want to go down a bad path … spending so much money and then just wanting to party and shit."

Another apprentice explained that college might be a good choice for those able to acquire scholarships, but his poor grades eliminated that possibility. Seeing the options that his school offered, one apprentice left high school after 10th grade, opting to earn his GED and start working instead of spending two more years in courses that he considered useless for his future.

Despite making it clear to their high school teachers and counselors that they did not want to attend college, the apprentices described receiving little support for alternative postsecondary pathways. One shared that when he told his school counselor that he was not considering college, the counselor disengaged from him and he, in turn, disengaged from the counselor, and this contributed to his withdrawal from any sort of postsecondary preparation during high school. Others described their teachers denigrating the work of people without a college degree. One apprentice explained,

> Well, like I said, you ask how this shit is going to pertain to the future and your life. And they said, "Oh, we're just getting you ready for college." Ever since sixth grade. That's all they ever said and then you tell them, "Well, what if I don't want to go to college?"
> "Well then I guess you might as well want to get a job as a janitor here." Like basically, they made it out to be that if you didn't get a college degree, you weren't going to mean shit.

Another apprentice had a similar interaction with a teacher. Sharing the experience with a focus group, he proudly explained that he was able to reveal the hollow basis of the teacher's elitism:

> I think I was in 11th grade. I think one of my teachers asked me if I wanted end up like one of the trash men. I ended up doing maintenance at [local waste management company]. You know what? I think in my second week there I pulled in over a thousand dollars. I mean, I didn't walk right into class and be like, "Look at this," but I thought about it.

The other apprentices in the focus group enjoyed this example, telling the speaker that he should have rubbed in the teacher's face that he made more money than the teacher probably did that week (without mentioning that he worked double the hours). This and similar stories provided a

sort of catharsis for the resentment that had built up during years of feeling looked down upon by educators. With their deep distrust of the teachers whom they felt had ignored their personal aspirations, one focus group came to the conclusion that high schools pocketed money from high college enrollment rates:

> Apprentice 1: They're basically brainwashing students now to go to college and spend a shitload of money. So, making sure their buddies that are working at a college or … For lack of a better explanation, they're all in bed together.
> Apprentice 2: That's where they get your money. Education is crazy.
> Apprentice 1: And these high schools probably get bonuses on more students that go to college. I wouldn't be shocked by any means. Because they force it down your throat.

The apprentices felt grateful that, despite their negative high school experiences, they had found a path into a trade. All brought up the strong wages, benefits, and the opportunity to "earn while you learn" as important for their work satisfaction. Almost as commonly cited (by 14 of the 20 apprentices) as a reason that apprenticeship and work in the trades was so appealing was the direct correlation between effort and reward that the jobs offered: "You're willing to work for it, you will go far." By establishing a good reputation, they explained, workers in the trades can move up within their companies, learning more advanced skills and taking on supervisory positions.

In terms of day-to-day enjoyment of work, many of the apprentices (12 in total) emphasized that the trades offer the appeal of variety. They contrasted their work with "desk jobs" that requiring sitting in an office all day, as well as repetitious jobs on assembly lines or at fast-food counters. Instead, the trades required them to change projects frequently and to constantly learn new skills. One apprentice explained, "I'll be at the weld shop for a couple weeks, or a month or two, and then I'm at bench or on CNC mill. So just experiencing every different place, just, I find it fun and entertaining." Another common source of satisfaction was

regularly seeing the results of one's efforts. One tool and die apprentice shared, "It's accomplishing to have something like, 'I made this, I designed it. And it works.'" An HVAC apprentice explained: "I think it's nice that you're able to drive somewhere, you pass by a place that you worked on. You installed the shit for that place and it kind of makes you feel proud."

Perhaps most important to many of the apprentices was the freedom that working in the trades gave them to support a full life outside of work. Like Nate, almost all (19 of the 20) of the apprentices I spoke with described their ultimate goals as revolving around self-sufficiency – specifically, being able to own a home, pay their bills, and support their family. The trades offered financial stability and work-life balance. Some explained that they regularly enjoy hobbies such as hunting and fishing, and in the future, they looked forward to being home in the evenings to "watch my [future] daughter cheer or my son play football."

For many of the apprentices, it had been a long, meandering path to wind up where they were now. Eight apprentices described their post-high school years as jumping from one low-skill job to another – cashier, fast-food worker, debt collector, low-skill construction laborer, landscaper – before learning about apprenticeships, which sounded "too good to be true" after the frustrations of the minimum wage work they had done. Three apprentices had acquiesced to the pressure to enroll in college after high school, but they but dropped out before completing the degree, leaving them to work off the student loans they had taken out. The majority had found their apprenticeship programs through family or friend connections, and they wished that they had learned of the option earlier. They were envious of their younger peers, such as Nate, who had explored apprenticeship while in high school.

According to these young adults, helping kids to discover pathways such as apprenticeships and other four-year college alternatives was of the utmost importance. During

one focus group, participants began hounding the instructor present, asking why the program did not do more outreach to high-school students (they do, the instructor explained, now that schools are more open to it). Having missed out on this exposure themselves, they were adamant that it would benefit young people who feel hopeless as they once had, as the following two apprentices shared:

> The whole throughout high school, "Oh trades, you'll never make any money. You'll never do good in life if you do a trade. They're not worth it." There needs to be more support, because not everybody is cut out for college. And they go through their entire high school panicking. "What am I going to do when I'm done in high school? I'm not going to have a life, and I'm not going to make it through college." But they need to be taught that if you don't want to go to college, or you can't go to college because you don't, whatever, there's still a very good life to be had. You just got to earn it.

> Yeah, I think schools, like high schools, they understand that people like us go through those schools. And they don't say, "Hey, if you're not going to go to college, that's okay." … They don't do that. They basically say, if you don't go to college, you're not going to be shit. And the way most of us who were basically treated that way, find out about this place just knowing somebody who's here. Growing up we don't get the knowledge that, "Hey, it's okay not to go to college. If you're willing to work, a trade will make you just as much, if not more money." That's not taught growing up. And it should be.

Given the years of stigma and anxiety the apprentices had suffered in high school, the bitterness expressed in these excerpts is understandable. In some ways, the apprentices' stories give us a window into the experiences of the non-concentrators discussed in Chapter 5. Their experiences are not directly comparable because the apprentices did not have the option of CTE in high school, while current non-concentrators did. However, the non-concentrators' overrepresentation among low-income and ethnic/racial minority students, combined with the underrepresentation of girls in CTE, suggests that many non-concentrators have faced their own barriers to CTE participation, whether in the form of stereotyped expectations, information constraints, or other obstacles. While these barriers are different from those that were faced by the apprentices, their

low vocational development and low academic preparation sets them up for a precarious transition to the world of work. The apprentices were happy to hear, once I shared it with them, that schools indeed were making an effort to teach students it was possible to be successful without attending a four-year college. They hoped that these efforts would reach more students like themselves, providing the opportunities that they had missed out on.

Taking stock of the experiences of students who did not have access to high school CTE drives home the points that educational stakeholders made in Chapter 1 about the urgent need for schools to expand and diversify their postsecondary preparation for underserved students. However, CTE implementation has been accompanied by exaggerations and misinformation that also have the potential to lead to scenarios such as Nate's, in which students make decisions for their futures – or at least, rationalize such decisions afterwards – based on inaccurate expectations of different career pathways. The exaggerations reflect education stakeholder efforts to undo the stigma of vocational learning and put CTE on equal footing with college-prep programs. In a system still struggling to define what equity means if students are intentionally prepared for different outcomes, it makes sense that stakeholders would highlight the cases of sub-baccalaureate careers that are comparable in salary to professional careers, arguing for their equality in this important dimension.

However, of the career rewards that the apprentices communicated as most valuable to them, salary was just one of many factors, albeit an important one. In exchange for daily variety in their work, opportunities for continual learning and growth, and a decent work-life balance, the apprentices were eager to acquire the sub-baccalaureate careers they were pursuing, despite the lower median income these jobs usually earn relative to most careers that require at least a BA. In this way, they were similar to the nationally representative sample of young adults

studied by Rosenbaum and colleagues (2017), who valued non-monetary job rewards more than earnings. These rewards included autonomy over daily work, the relevance of work to one's future career goals, the perceived status of the work, a lack of repetition, and contributions to society.

As discussed, CTE policymakers emphasize the importance of keeping CTE students' access to college open at all times, maintaining the contest mobility ideals of educational opportunity – and the associated status hierarchy of education and occupations – embodied in the CFA era. Oaksburg education stakeholders have taken the opposite approach, constructing and reifying differences between college-prep and CTE pathways while arguing for their equivalence in terms of status and earnings outcomes. Their goal has been to redefine the meaning of educational opportunity to better match the realities of the local higher education and industry landscape. But rather than highlighting exceptionally lucrative sub-baccalaureate careers, this redefinition project likely would have been better supported by communicating the multifaceted rewards of various careers to students as accurately as possible. It is clear that, for students like Nate and other CTE concentrators, alternatives to attending a four-year college offer not just a backup option, but opportunities that have a lot of appeal in their own right. Educators are likely to find that many high school students, like the apprentices discussed in this chapter, value nonmonetary rewards as much as earnings, rendering the need for misrepresentative or incomplete information about expected earnings unnecessary for portraying CTE as a reform that promotes equity. Educators have begun this work by highlighting the social contributions of sub-baccalaureate workers, portraying the respect they earn for these contributions as a non-monetary career reward. Providing students with access to more accurate and complete information would

help to ensure that their decisions to pursue these pathways are aligned with their goals and expectations.

The work to negotiate and redefine educational equity in and through CTE is likely to continue as federal, state, and local policymakers increasingly allocate resources to implement and study career education and training. The COVID-19 pandemic, which continues at the time of writing this dissertation, has heightened concerns about equity in students' access to educational resources. The abrupt transition to computer-based remote learning nationwide at the outset of 2020, just months after the completion of data collection for this dissertation, created learning disruptions for all students. Researchers anticipate finding that the learning of low-income, ethnic minority, and immigrant students has been especially impacted during this time (García & Weiss, 2020). It is possible that CTE will be sidelined as educational systems return to in-person learning and schools attempt to make up lost ground in foundational academics for their most vulnerable students (Association for Career and Technical Education, 2020). However, through the absence of in-person school activities, including opportunities for the hands-on projects around which CTE is centered, the pandemic has also brought renewed attention to the importance of "non-cognitive" dimensions of learning that these activities provide, including problem-solving, persistence, time management, and interpersonal skills (García & Weiss, 2020). An even more pressing motivation to ramp up investments in CTE, from a policy perspective, is the goal of addressing long-term pandemic-related job losses. The economic impacts of the pandemic have added urgency to the Biden administration's calls for free workforce training and community college (Superville, 2021), initiatives that are increasingly receiving bipartisan support at the level of state governments. These efforts reflect a growing consensus that affordable, sub-baccalaureate education programs, including secondary

and postsecondary CTE, will be central to post-COVID-19 economic recovery efforts (e.g., Hansen & Lomax, 2021; Harvey-Smith, 2021; Haviland et al., 2021).

Additionally, the pandemic has spotlighted the issue of fair compensation for sub-baccalaureate workers. The majority of "essential workers," whose work during the pandemic has been deemed by the U.S. government as necessary for the continuation of critical functions, work in jobs that do not require bachelor's or advanced degrees. These include both sub-baccalaureate workers and workers with no postsecondary education in healthcare, manufacturing, transportation and logistics, information technology and communication, and maintenance and repair (Centers for Disease Control, 2021). These workers' role in keeping the national economy afloat during crisis has prompted discussions about increased wages, starting with an increased minimum wage, to better reflect their social contributions (e.g., Lucas, 2020; Stateler, 2021). Given Oaksburg's conservative leanings, most of the educational stakeholders I spoke with, especially the industry representatives, likely would not be in support of a federal minimum wage increase. However, the issue at the heart of this national conversation – the need to restore avenues to middle-class lifestyles for the workers who make up the backbone of the U.S. economy – speaks directly to the education stakeholders' efforts to elevate the social standing of middle-skill work.

Looking forward, recognition of the importance of high-quality worker preparation will likely lend continued momentum to the CTE movement and broader efforts by policymakers and practitioners to reformulate the meaning of postsecondary success. These reformulations will require anticipating, preventing, and confronting the myriad ways in which the development of multiple postsecondary pathways might further widen opportunity gaps by tracking marginalized students into lower-tier types of education and training. Future CTE research will no doubt

continue to center on causal estimates of how CTE programs affect diverse students' long-term outcomes. This research should also attend to questions about why CTE students attain these outcomes, with a focus on differences across programs and student populations in how well CTE enhances students' academic preparation, vocational development, access to information and social capital, and, ultimately, ability to achieve the goals that they set for themselves. Central to understanding the features of the most successful CTE programs will be attention to school leadership and organizational sensemaking as communities reconstruct the meanings of educational equity from the ground up.

## Appendix A: Situating Debates About CTE Within Credentialing Theories of Education

The growing commitment to college access in the past two decades has, contradictorily, occurred alongside stagnating rates of social mobility. In fact, social mobility in the United States has been declining for all generations since those born in the 1940s, but the declines have been especially dramatic for Americans born since 1980, who had higher college attendance rates than any previous generations (Hout, 2019). These declines in social mobility have resulted primarily from growing inequality in the distribution of GDP growth over time (Chetty et al., 2016). Credentialing theory can help to explain how an education system committed so strongly to opportunity for upward mobility fails to overcome and, in fact, can reinforce inequalities in the distribution of capital across social groups.

Credentialing theory has its roots in Weber's concept of status groups. According to Weber, historical membership in religious, ethnic, or occupational communities served as a credential, a signal to other group members of an individual's trustworthiness and competence to perform according to shared expectations and interests. Such signaling was important in that it allowed powerful groups to monopolize access to privileges through social closure, or the restriction of access to the group's resources through mutual recognition of members and exclusion of outsiders (Parkin, 1979). Under capitalism, formal educational credentials evolved, as groups with monopolies on access to various desirable parts of the labor market developed signals of group belonging with legal-rational authority. The development of standardized degrees and occupational degree requirements obscured the true nature of power relationships between those with and without educational credentials (Weber, 1946b). Schools took on the role of restricting the supply of students who earn such credentials, while simultaneously legitimizing conformity to powerful status groups' expectations as a form of meritocratic achievement in the

open contest for upward mobility (Sorokin, 1959). Educational credentials, then, function as a sorting mechanism that can provide upward mobility for individuals who ascribe to powerful status groups' claims to authority. However, according to conflict theorists, this very upward mobility through credential acquisition reproduces social stratification by validating the superiority of those powerful groups.

Pierre Bourdieu (1986), drawing on work by Weber, considered educational credentials to be institutionalized forms of cultural capital, or dispositions, attitudes, tastes, and other cultural competences arbitrarily valued by the dominant class, and to which the dominant class is acculturated from an early age. By imposing on other members of society a hierarchical value system in which these dispositions and competencies are recognized as superior, the dominant class legitimizes its social positioning as borne of innate competence as well as acquired merit. This process of domination, which Bourdieu terms "symbolic violence," happens primarily through schooling, which imposes dominant group cultural norms by recognizing and inculcating only practices and knowledge forms that conform to those norms, while devaluing the cultural competencies of subordinate groups. Students who carry dominant cultural capital are rewarded with symbols of merit in the form of educational credentials that can be exchanged for prestigious positions in the labor market. According to this view, cultural capital functions to disguise the intergenerational transmission of exclusive access to wealth and power, and schools are a tool of the dominant class to monopolize this access by reproducing the market in which their own cultural competence is elevated (Bourdieu, 1977).

By conforming to these norms, students from subordinate classes can accumulate cultural capital. However, the effortful process of acquiring competencies that children from the dominant class have internalized from birth puts students from subordinate groups at an early

disadvantage, and they are unlikely to have the economic and cultural resources to continue as long as their more advantaged peers the process of accumulating and refining cultural capital in exchange for prestigious educational credentials. The exceptional students from subordinate cultural groups who are successful at acquiring prestigious credentials are viewed as testaments to the system's openness, in which hard work and talent are rewarded with social mobility. Thus, a limited amount of upward mobility, earnestly facilitated by teachers performing "the gentle violence of cultural missionary work" (Bourdieu, 1984, p. 160), serves to reinforce misrecognition of the dominant group's disproportionate attainment of prestigious educational credentials and occupational titles as based in merit (Bourdieu, 1977; Bourdieu & Passeron, 1990).

Around the same time that Bourdieu wrote about credentials as institutionalized cultural capital, other conflict theorists made similar arguments that educational credentials served to protect high social classes' claims on prestigious careers (Holt & Fromme, 1964; Illich, 1970; Kozol, 1972). In his seminal book, *The Credential Society: A Historical Sociology of Education and Stratification* (1979), Randall Collins argued that credentials are an "arbitrary currency" (p. 258) – arbitrary save for requiring time and resources available mainly to wealthy social classes – and that they serve to legitimize social stratification through an ideology of merit.

Credentialing theory in sociology stands in contrast to signaling theory in economics. Like credentialing theory, signaling theory holds that education credentials signal a worker's ability to outcompete their peers in the race for high-status occupations (Arrow, 1973; Caplan, 2018; Spence, 1973). However, signaling theorists hold that these signals are more or less accurate indicators of ability, intelligence, and other forms of productivity, rather than of cultural capital. Both credentialing and signaling theory stand in contrast to the human capital theory of

education. Human capital economists argue that formal education does not signal, but actually imparts knowledge, skills, cultural competencies, and other economically productive attributes that employers value. According to human capital theorists, investments in education improve both individual well-being by improving worker income and social well-being by increasing the productivity and wealth of society (Becker, 1993; Schultz, 1961). Unlike credentialing and signaling theories, which hold that the process of attaining educational credentials is a zero-sum competition with rewards going only to the winners, human capital theory implies that education increases the share of rewards to go around. In other words, when more people gain more education, all ships rise. While most economists and sociologists agree that educational credentials represent some mix of both human capital accumulation and an individual's ability to outcompete their peers, they debate which theory bests explains the function of educational credentials. Importantly, different education systems can be characterized to different extents by the role of credentialing or signaling versus human capital development (Hansen, 2011; Ishida et al., 1997; Kerckhoff, 1995; Shavit & Müller, 1998). A fundamental aspect of a system characterized by credentialing or signaling is credential inflation, or the increase over time in the formal educational qualifications required for a job despite little to no change in the knowledge or skills (i.e., human capital) required by the job.

Rising credential requirements for various jobs are well-documented in the United States. Over the course of the 20$^{th}$ century, more individuals invested time and resources into attaining educational credentials in order to access their associated rewards, and ideals of fairness based on an ideology of contest mobility created pressure for schools to grant credentials to more and more students in the name of educational equality (Labaree, 1997). Simultaneously, employers increased educational requirements for various positions. High school diplomas, scarce

qualifications in the early 1900s that conferred access to middle-class careers, became stepping-stones to postsecondary attainment with little labor market value of their own. Higher education institutions responded to consumer demand for more distinguished credentials by increasing the supply of college degrees (Labaree, 1997). Today, BAs are increasingly losing their distinctiveness as well, serving as a minimum qualification for many careers that once required a high school diploma.

Human capital theorists argue that increasing degree requirements reflect increasing skill demands as jobs become more complex and technologically advanced. Additionally, even as BA attainment has increased, BAs have maintained a large premium over sub-baccalaureate and high school degrees, on average, suggesting that employers value the skills college graduates have. However, analyses of job postings suggest that many employers have recently added BA requirements to jobs that have not changed in skill demands (Burning Glass, 2014; Fuller & Raman, 2017). Furthermore, even as the college degree premium has remained high, the income that BA holders earn has declined. The median annual salary for BA holders dropped from $58,200 to $54,700 (in 2018 dollars) between 2000 and 2018, continuing a trend that began before the 2008 recession (National Center for Education Statistics, 2020b). The continued benefits of a BA are the result of an even greater drop in earnings for high-school diplomas and sub-baccalaureate degrees (Abel & Deitz, 2016; National Center for Education Statistics, 2020b). This suggests that the goalposts have moved, consistent with a credentialing argument, rather than a human capitalist theorist's argument that demand has increased for the skills conferred by BAs.

As a result, workers without college degrees face severe wage penalties (Fuller & Raman, 2017), while an increasing proportion of workers with BAs are underemployed, working in

positions that are held primarily by non-degree holders in the generations before theirs (Abel et al., 2014; Burning Glass, 2018). To access higher-status jobs, students compete fiercely for degrees from prestigious universities that will help them to stand apart from the crowd of BA holders, and the proportion of students pursuing graduate degrees steadily increases. Indeed, graduate degree attainment has doubled over the past two decades (National Center for Education Statistics, 2020b). Within universities, students prioritize earning grades that will make them competitive relative to their peers with similar degrees. Grade inflation often goes hand-in-hand with credential inflation, as universities face pressure to expand access to the qualifications that make students competitive for professional schools and high-status occupations (Labaree, 1997).

As a result of credential and grade inflation, students come to learn that what matters for their ability to get a job is not the learning that they have acquired or its relevance to their future careers, but rather, the exclusiveness of their qualifications relative to their competitors. Labaree (1997) terms the value of these qualifications as exchange-value rather than use-value, in that their worth derives from the occupational positions they can be exchanged for, rather than the application of the learning that they represent. Students are incentivized to earn the degree and the grades rather than to learn for pragmatic purposes or for the intrinsic value of learning (Collins, 1979). Educators lament the effects of this incentive structure, which results in students putting in the minimal effort necessary to earn the grades and the degrees that will set them apart. In turn, an education system characterized by credential inflation results in a society with less knowledge and fewer skills than one with an education system more consistent with human-capital development (Caplan, 2018; Collins, 1979), even as the credentialist system spends ever-higher amounts on higher education.

Arguably, even more socially damaging than its effects on learning is credentialing's effects on social stratification. In the process of credential inflation, wealthy social classes maintain exclusive access to elite careers and powerful social positions because the corresponding qualifications increasingly rise, staying out of reach for less resourced groups, who are unable to make the same investments of financial, social, and cultural capital into elite education. Collins's major contribution to credentialing theory was a theoretical explanation for this process by which credential inflation contributes to broader patterns of social reproduction. He explained, "As education has become more available, the children of the higher social classes have increased their schooling in the same proportions as children of the lower social classes have increased theirs" (1979, p. 243), resulting in a maintenance of intergenerational rates of social mobility. Bourdieu, too, considered credential inflation to be a main mechanism by which powerful social groups maintained access to exclusive occupations. He provided a similar explanation of how the gaps between social groups are maintained: "Each group having as its past the group immediately below and for its future the group immediately above … The competing groups are separated by differences which are essentially located in the order of time" (1984, p. 160). At the time in the 1970s when Collins was writing about credential inflation, he observed that intergenerational mobility rates had remained approximately the same since the 1920s. Today, intergenerational mobility is much lower than at the time of Collins' writing, with generations born in 1980 approximately 40 percentage points less likely than those born in 1940 to earn more than their parents (Davis & Mazumder, 2017).

Importantly, credential inflation is not an inevitable outcome of educational certification. In Germany, almost half of students enter the dual system of education, where they spend their late high school years taking classes in vocational schools and apprenticing at small- and mid-

sized companies. Despite its much more extensive and elaborate system of certifications, Germany has undergone only minimal credential inflation and expansion of higher education relative to the United States. This reflects the high quality of German credentials, which have been developed for over 350 occupations and are highly regulated by the national government (Hansen, 2011). Because the credentials reflect rigorous standards established through partnerships between government, unions, and industry, they are considered trustworthy by employers, and students are not incentivized to seek out additional training beyond what is required for the occupation they seek (Müller & Shavit, 1998). This system demonstrates that there is variability across systems of education in how much they align with credentialing versus human capital models (Hansen, 2011).

Americans laud Germany's efficient training systems and strong industry. However, they often assume that the German education system, by tracking students early into vocational and academic programs, provides much less opportunity for social mobility than the U.S. system. Germany's vocational track indeed consists disproportionately of low-income and ethnic minority students, and the country has aimed to increase mobility by creating new opportunities for vocational graduates to pursue higher education. Despite its explicit tracking system, Germany has a rate of social mobility similar to that of the United States (Corak, 2006; Hertel & Groh-Samberg, 2014; Schnitzlein, 2014, 2016). At the same time, Germany has a smaller economic underclass and larger middle class than the United States (Kochhar, 2017), suggesting that it does a better job at preparing citizens at the lower levels of its occupational hierarchy to earn a decent living. Other nations with strong systems of vocational education, including Austria, Denmark, Finland, the Netherlands, Norway, and Switzerland, have higher rates of social mobility than the United States (World Economic Forum, 2020). It is important to

acknowledge that a range of factors affect intergenerational rates of income mobility, including social redistribution systems and other government safety nets. Denmark, known for its social safety nets, has the world's highest rate of social mobility, despite having intergenerational education mobility similar to that of the United States (Landersø & Heckman, 2017). Its system of vocational tracking begins in late high school. These patterns suggest that the American way of expanding universal access to ever-higher levels of education, ensuring each successive generation has more educational qualifications than the previous, may reflect credentialing rather than exceptional equality of opportunity. In contrast, a number of European systems are able to offer similar rates of social mobility, while simultaneously investing in strong human capital development at all levels of occupational preparation through vocational education.

Over time, according to Collins (1981), systems characterized by steadily rising credential inflation reach a crisis. As the time and financial costs of producing higher credentials reaches its limit, the number of credential-holders overwhelms the supply of available professional jobs. The public becomes disillusioned with credential-conferring institutions, and informal alternative cultural producers expand, fueled in part by those with formal degrees unable to find professional employment. Enrollment in formal educational institutions declines and tuition rises even as the returns to credentials fall, leading a number of institutions to close or resort to selling low-cost degrees with very little exchange-value, further exacerbating the crisis. The contraction of credential-conferring institutions continues over an extended time period, simultaneously threatening the political structure these institutions supported, until a new cultural currency in dialectical opposition to the previous credentialing regime becomes formalized. Collins asserts that his cycle of credential expansion, crisis, and contraction characterized a range of cultural regime changes in the past, such as the crises of the T'ang and Sung dynasties and of

medieval universities. In this way, Collins argues, educational institutions play a primary role not only in the reproduction of social stratification, but also in the emergence of new forms of stratification.

Bourdieu (1984) also noted the potential for credential inflation to initiate structural change. Although his theoretical framework explained the preservation and reproduction of the social hierarchies, he acknowledged the potential for social change when credential inflation necessitated a change in strategy for social groups seeking to achieve or maintain access to valued social positions. For example, Bourdieu (1990) attributed the leftist anti-establishment movements in late 1960s France to an overproduction of academic credentials, resulting in hysteresis, or a mismatch of the values, dispositions, and expectations individuals acquired in one social context and the structure of opportunities available to them in changed social environments (in this case, an environment in which a large proportion of people held once-exclusive credentials). Unlike Collins, who theorized social change as occurring over the span of multiple generations adjusting to gradually shifting social environments, Bourdieu (1984) speculated that more sudden shocks to the social structure and the opportunities it provides could cause marginalized groups to question the value systems they had once internalized. He wondered about,

> the conditions (economic crisis, economic crisis following a period of expansion and so on) in which the dialectic of mutually self-reproducing objective chances and subjective aspirations may break down. Everything suggests that an abrupt slump in objective chances relative to subjective aspirations is likely to produce a break in the tacit acceptance which the dominated classes – now abruptly excluded from the race, objectively and subjectively – previously granted to the dominant goals, and so to make possible a genuine inversion of the tables of values. (p. 164)

In this way, Bourdieu introduced the possibility that individual strategizing, in aggregate, could cause a change in the social hierarchy via a rejection of the cultural value systems that undergird

and justify an increasingly closed opportunity structure. Educational credentials, as "certified prestige," (Collins, 1981, p. 211) may lose their cultural value among those who no longer feel the opportunities they once conferred are within reach.

Other forms of training, however, avoid this cycle of rising and falling value as their exchange-value fluctuates. According to Collins (1981), the labor market value of direct, often informal practical training for technical skills is tightly linked with employer demand. This reflects the tangibility of the human capital such training confers, as opposed to the arbitrariness of symbolic capital, mutable as cultural boundaries shift. The German system shows how technical training, even when certified through vocational credentials, can be relatively immune to the credential inflation that plagues prestige-based credentials. Instead, it corresponds much more closely to the demands of the labor market.

In times when economic crisis shifts opportunity structures in a way that diminishes the economic and cultural value of formal credentials, vocational training may therefore become an attractive alternative. Observing the hysteresis of those whose credential investments failed to produce the expected rewards, individuals may consider the prospect of low-cost training with a payoff regulated by relatively predictable forces of labor market supply and demand especially appealing. A number of credentialing and signaling theorists have proposed some form of vocational learning as a solution to runaway degree inflation (Caplan, 2018; Holt & Fromme, 1964; Illich, 1970). They argue that, by ensuring all students have access to meaningful training that has real use-value on the labor market, a high-quality vocational system should prevent the formation of an underclass with no recognized skillsets. Vocational certifications incentivize students to learn marketable skills, thereby increasing the knowledge and wealth of society as a whole. Simultaneously, because employers do not reward vocational credentials beyond that

required for a given occupation, investments in vocational education prevent excessive private and public spending on inflated degrees.

In the United States, the prospect of vocational education gaining steam as individuals strategize in response to heightening degree inflation is tempered by the ideals of contest mobility deeply ingrained into American ideals of equity and educational structures. Skeptics of vocational education note that vocational tracking inevitably results in an overrepresentation of low-income and ethnic minority students in less lucrative vocational fields, as more advantaged students pursue more exclusive degrees. They also pose the concern that the early salary benefits that accrue to vocational students may be offset later in life due to low employment flexibility (Forster et al., 2016; Hanushek et al., 2011) (although this effect has been debated; see recent work by DiPrete and colleagues (2018)). In response to concerns about the way vocational education reproduces social stratification, modern CTE in theory has been designed to provide students not only with educational off-ramps into middle-skill occupations, but also multiple on-ramps that allow students to return for higher levels of education in the future. Through coursework that includes rigorous academics, articulation agreements with higher educational institutions, and communication with vocational students about how to access higher education, this model of vocational education aims to provide both "floors" in the form of guaranteed job skills and "doors" in the form of opportunity to attain higher levels of education. Yet CTE advocates downplay the fact that students who take an "off-ramp" are less likely to attain a four-year degree or higher than if they were to stay the course with the academic route (Bozick & DeLuca, 2005; Roksa & Velez, 2012). And no matter how much policymakers emphasize the importance of preserving and promoting college access in CTE, the actual implementation of CTE programs may vary widely from policymaker ideals as they are adapted to diverse settings

with differing resource constraints, labor market opportunities, and student populations. On a fundamental level, debates about degree inflation and vocational training speak to longstanding tensions in the goals of the U.S. education system both to provide equal opportunity for advancement and to ensure citizens with all levels of education have access to decent jobs.

## Appendix B: Education Stakeholder Interview Schedules

| Educator/Workforce Community Organization Interviews | |
|---|---|
| Question | Probe |
| Broadly, what does success mean to you? | • Success in<br>  ○ work?<br>  ○ family?<br>  ○ community?<br>• Which of these is most important for a successful life? |
| What would success look like for students? | • Does the meaning of success vary for different students? If so, why? |
| What specific goals or expectations do you hold for your students? | • What do you think all students should be prepared to do upon graduating high school? Do you hold all students to the same expectation, or does it vary by the individual?<br>• Should all students acquire some level of education beyond high school? If not, which students should seek higher education and why?<br>• What types of jobs should students be prepared for?<br>• How have your goals for students changed over time? What have been the major influences on these changes? |
| What are the major obstacles students face in achieving these goals? | • How does financial constraint shape student outcomes? Academic preparation? |
| Next, I'm going to present some hypothetical students and ask what career advice you would give them | • Academically high-achieving student from high-income family with range of interests?<br>• Academically high-achieving student from family facing financial obstacles? Different for different genders?<br>• Academically low-achieving student from high-income family? Different for different genders?<br>• Academically low-achieving student from family facing financial obstacles? Different for different genders? |
| Are your goals/expectations for students shared by their parents? By youth themselves? | • How do youth navigate competing expectations? |
| Next, I have some questions about your school/organization and education more broadly | |

| | |
|---|---|
| Are your goals/expectations for students shared by your school/organization? | • Are the expectations different for different students?<br>• How have the school's goals/expectations for students changed over time? What have been the major influences on these changes?<br>• How does the school/organization support students in meeting these expectations? |
| What class do you teach/what program do you deliver? | • How does this class/program help students achieve the expectations you have for them? |
| Broadly, what do you perceive to be the role of education? | • Locally?<br>• Nationally? |
| Now I have some questions about the broader community. | |
| What is the state of local economic opportunity? | • What are your predictions for local economic opportunity in the future?<br>• What are the current employment prospects for students, and will they change in ten or twenty years? |
| Do you expect most students will live in the local community as adults or move elsewhere? | • Does this vary for different students?<br>• What aspects of the community create opportunities for youth? What aspects create obstacles? |
| To wrap up, I'd like to learn a little more about you. | |
| • How long have you been in your current position?<br>• Where did you go to school, and what jobs have you held before your current position?<br>• What do you consider to be your ethnic identity? What other aspects of your identity do you feel are important?<br>• Where do you currently live, and how long have you lived there? Where else have you lived? | |

| Employer Interviews | |
|---|---|
| Question | Probe |
| Broadly, what does success mean to you? | • Success in<br>  ○ work?<br>  ○ family?<br>  ○ community?<br>• Which of these is most important for a successful life? |
| What would success look like for your apprentices/young people today? | • Does the meaning of success vary for different apprentices/young people? If so, why? |
| What specific goals or expectations do you hold for your apprentices/young people? | • What types of jobs should students be prepared for?<br>• Do you think your students should acquire some level of education beyond high school? If not, which students should seek higher education and which should start working? Why?<br>• How have your views on this changed over time? What have been the major influences on these changes? |
| What are the major obstacles your apprentices/young people face in achieving these goals? | • In what ways are apprentices/young people most and least prepared to meet these expectations?<br>• How does financial constraint shape their outcomes? |
| Next, I'm going to present some hypothetical young people and ask what career advice you would give them | • Academically high-achieving student from high-income family with range of interests?<br>• Academically high-achieving student from family facing financial obstacles?<br>• Academically low-achieving student from high-income family?<br>• Academically low-achieving student from family facing financial obstacles? |
| Are your goals/expectations for your apprentices/young people shared by their parents? Their teachers and schools? By youth themselves? | • How do youth navigate competing expectations? |
| Can you tell me more about the apprenticeships/internships/programs that you offer? | • Do you partner with youth schools?<br>• How many apprentices go on to work at your company upon graduating high school?<br>• What incentives does your company have to support apprenticeships? |

| | |
|---|---|
| | • How does this program support youth in reaching the goals you outlined earlier? |
| What is the state of local economic opportunity? | • What are your predictions for local economic opportunity in the future?<br>• What are the current employment prospects for students, and will they change in ten or twenty years? |
| Do you expect most of your apprentices/young people will live in the local community as adults or move elsewhere? | • Does this vary for different youth?<br>• What aspects of the community create opportunities for youth? What aspects create obstacles? |
| To wrap up, I'd like to learn a little more about you. | |
| • How long have you been in your current position?<br>• Where did you go to school, and what jobs have you held before your current position?<br>• What do you consider to be your ethnic identity? What other aspects of your identity do you feel are important?<br>• Where do you currently live, and how long have you lived there? Where else have you lived? | |

## Appendix C: Survey on Educational and Vocational Decision-Making

The text below shows the survey administered to OHS students.

Welcome! You are being asked to participate in a survey as part of a study by researchers at the University of Chicago about how students develop goals for after high school. Please advance to the next page to read about the survey and how your responses will be used. You will then be asked to provide consent.

**STUDENT CONSENT FORM FOR SURVEY PARTICIPATION**

**What are the possible risks or discomforts?** To the best of our knowledge, participating in this study has no more risk of harm than the risks of everyday life.

**What are the possible benefits for me or others?** Taking part in this research study may help your school leaders understand your experiences and perspectives so that they can design programs that support your goals.

**How will you protect the information you collect about me, and how will that information be shared?** Your study data will be handled as confidentially as possible. Your survey answers will be sent to a link at OneClick Survey (1ka.si) where data will be stored in a password protected electronic format. 1KA does not collect identifying information such as your name, email address, or IP address. You will be asked to share your student ID number, which will be stored confidentially on a protected server. If you give permission, your student ID will be used to link your survey answers to your course-taking and GPA records. Your data will then be combined with other students' data to help researchers understand student experiences at school. However, your name will not be collected or recorded. Results of this study may be used in publications and presentations, but no information that could be used to identify individuals will be shared.

**Financial Information** Participation in this study will involve no cost to you. You will not be paid for participating in this study.

**What are my rights as a research participant?** Participation in this study is voluntary. You do not have to answer any question you do not want to answer. If at any time and for any reason you would prefer to stop participation in this study, please feel free to stop participating. You will not be penalized in any way for deciding to stop participation.

**Who can I contact if I have questions or concerns about this research study?** If you have questions, you may contact the researchers at: Sarah Cashdollar, University of Chicago, (443) 610-0894, scashdollar@uchicago.edu Dr. Guanglei Hong, Principal Investigator, University of Chicago, ghong@uchicago.edu. If you have any questions about your rights as a participant in this research, you can contact the following office at the University of Chicago: IRB Study Number: IRB17-1021 Social & Behavioral Sciences Institutional Review Board, Phone: (773) 834-7835 Email: sbs-irb@uchicago.edu

**Electronic Consent**

If you agree to participate in the study, please check both boxes.

- ☐ I have read the information above. If I have questions, I have been told whom to contact. I agree to participate in the research study described above.
- ☐ I agree to having my de-identified course-taking and GPA records linked to my anonymous survey responses.

**1. Student ID:**

**2. How much does each of the statements below sound like you?**

| | Not at all like me | Not really like me | A little like me | Mostly like me | Very much like me |
|---|---|---|---|---|---|
| I am happy that I live in this community | | | | | |
| I have a sense of belonging in my community | | | | | |
| I have pride in my community | | | | | |

**3. How much do you agree with each of the following?**

| | Strongly Disagree | Disagree | Neither agree nor disagree | Agree | Strongly Agree | Don't know |
|---|---|---|---|---|---|---|
| It is easy for people to get a good paying job around here | | | | | | |
| A lot of people get benefits like healthcare or vacation for most jobs in this area | | | | | | |
| There are good jobs in the area for people like me | | | | | | |

**4. How much do you agree with each of the following?**

| | Strongly Disagree | Disagree | Neither agree nor disagree | Agree | Strongly Agree | Don't know |
|---|---|---|---|---|---|---|
| School is one of the most important things in my life | | | | | | |
| Most of what I learn in school will be useful when I get a job | | | | | | |
| Dropping out of school would be a huge mistake for me | | | | | | |
| School is more important than most people think | | | | | | |
| School is important to getting a good job | | | | | | |
| The kind of education I'm getting now will help me later on | | | | | | |
| What I study in school | | | | | | |

| | Strongly Disagree | Disagree | Neither agree nor disagree | Agree | Strongly Agree | Don't know |
|---|---|---|---|---|---|---|
| seems important to me | | | | | | |

**5. How would you rate your abilities in the following subjects?**

| | Very Poor | Poor | Okay | Good | Excellent | Not Applicable |
|---|---|---|---|---|---|---|
| English/Language Arts | | | | | | |
| Math | | | | | | |
| Sciences | | | | | | |
| Social Studies | | | | | | |
| Media courses (Photo, Video, Graphics, Drafting) | | | | | | |
| Tech Ed shop courses (Wood, Metal, Machining, Electronics) | | | | | | |
| Business | | | | | | |
| Family & Consumer Sciences | | | | | | |
| Other classes | | | | | | |

**6. Where would you like to live when you are 30 years old?**

In or near my home community in PA
Somewhere else in PA
A neighboring state like Maryland or Delaware
Other:
Haven't decided

**7. How do you think your parent(s) or guardian(s) would feel if you didn't graduate from a four-year college?**

Mark your answer on the scale from 0 (Unhappy/Very Disappointed) to 5 (Happy/Not at All Disappointed)

**8. What is your grade level?**

9th grade
10th grade
11th grade
12th grade

**9. During your time in high school, how many courses do you plan to complete in the following categories?**

| | None | 1 course | 2 courses | 3+ courses | Don't know |
|---|---|---|---|---|---|
| Family and Consumer Sciences courses (Sewing, Child Development, Food & Nutrition, Teacher Aide, etc.) | | | | | |
| Business courses OTHER THAN Personal Finance (Microsoft Office, Accounting, Media Design, etc.) | | | | | |
| Media courses (Photo, Video, Graphics, Drafting) | | | | | |
| Tech Ed shop courses (Wood, Metal, Machining, Electronics) | | | | | |
| Level 3/Honors Courses | | | | | |
| Level 4/Dual Enrollment, College in the High School, or AP courses | | | | | |
| Other: | | | | | |

**10. Which Family and Consumer Sciences subjects do you plan to complete by the time you graduate?** [question depends on skip logic]

| | None | 1 course | 2 courses | 3+ courses |
|---|---|---|---|---|
| Sewing | | | | |
| Child Development/Preschool Lab | | | | |
| Food & Nutrition/Specialty Foods/Foreign Foods | | | | |
| Housing/Interior Design | | | | |
| Family Development/Independent Living | | | | |
| Student Teacher Aide | | | | |

**11. Which Family and Consumer Sciences subjects do you plan to complete by the time you graduate?** [question depends on skip logic]

| | None | 1 course | 2 courses |
|---|---|---|---|
| Sewing | | | |
| Child Development/Preschool Lab | | | |
| Food & Nutrition/Specialty Foods/Foreign Foods | | | |
| Housing/Interior Design | | | |
| Family Development/Independent Living | | | |
| Student Teacher Aide | | | |

**12. Which Family and Consumer Sciences subject do you plan to complete by the time you graduate?** [question depends on skip logic]

Sewing
Child Development/Preschool Lab
Food & Nutrition/Specialty Foods/Foreign Foods
Housing/Interior Design

Family Development/Independent Living
Student Teacher Aide

**13. Please select all that apply to you.**
I have held a part-time or full-time job in the past
I currently have a part-time job
I currently have a full-time job
I have participated in SAT prep or ACT tutoring in the past
I currently participate in SAT prep or ACT tutoring
I plan to participate in SAT prep or ACT tutoring in the future
None

**14. Which track do you plan to select by the end of sophomore year?** [question depends on skip logic]
Career Readiness Track
College Readiness Track
Undecided

**15. Do you plan to attend [LOCAL TECH PREP] in your junior and senior years?** [question depends on skip logic]
Yes
No
Maybe

**16. Which program(s) at [LOCAL TECH PREP] are you interested in?** [question depends on skip logic]
Check all that apply

Allied Health
Computer Networking
Culinary Arts
Diesel Mechanics
Law Enforcement

**17. Do you attend [LOCAL TECH PREP]?** [question depends on skip logic]
Yes
No
I used to attend but no longer do

**18. Which program at [LOCAL TECH PREP] do you participate in?** [question depends on skip logic]

**19. Which program at [LOCAL TECH PREP] did you participate in?** [question depends on skip logic]

**20. Do you expect to complete any of the following by the time you graduate high school?**

Check all that apply

Occupational certification (e.g., NOCTI, NIMS, AWS credential, ServSafe credential, etc.)
Pre-apprenticeship
Career Ready Endorsement/local credential
College credits through Level 4/Dual Enrollment, College in the High School, or AP courses
Associate degree (AA)
Other:
None of these

**21. Choose the answer that best represents your present opinion. In thinking about planning for an occupation or career:**

| | Completely TRUE | Somewhat TRUE | Somewhat FALSE | Completely FALSE |
|---|---|---|---|---|
| I am not sure that my present career choice is right for me | | | | |
| I don't know enough about what workers do in various careers | | | | |
| No single career appeals strongly to me | | | | |
| I am uncertain about which career I would enjoy | | | | |
| I would like to increase the number of careers I could consider | | | | |
| My estimates of my abilities and talents vary a lot from year to year | | | | |
| I am not sure of myself in many areas of life | | | | |
| I have known what career I want to follow for less than one year | | | | |
| I can't understand how some people can be so sure about their plans for the future | | | | |

**22. Choose the answer that best represents your present opinion. In thinking about planning for an occupation or career:**

| | Completely TRUE | Somewhat TRUE | Somewhat FALSE | Completely FALSE |
|---|---|---|---|---|
| I need reassurance that I have made the right choice of career | | | | |
| I am concerned that my present interests may change over the years | | | | |
| I am uncertain about the careers I could perform well | | | | |
| I don't know what my major strengths and weaknesses are | | | | |
| The careers I can do may not pay enough to live the kind of life I want | | | | |

| | Completely TRUE | Somewhat TRUE | Somewhat FALSE | Completely FALSE |
|---|---|---|---|---|
| If I had to make a career choice right now, I'm afraid I would make a bad choice | | | | |
| I need to find out what kind of career I should follow | | | | |
| Making up my mind about a career has been a long and difficult problem for me | | | | |
| I am confused about the whole problem of deciding on a career | | | | |

**23. On average, what do you think is the typical salary of a person with a(n)**

| | Thousands of dollars per year (move sliding scale to number between $0 and $100,000) | Don't know |
|---|---|---|
| High school diploma or GED? | | |
| Occupational credential or certificate (e.g., NOCTI, NIMS, AWS credential, Journeyman papers, ServSafe credential, etc.)? | | |
| Associate degree/AA (2-year degree)? | | |
| Bachelor's degree/BA (4-year degree)? | | |
| Advanced degree (Master's, MD, PhD, JD, etc.) | | |

**24. How much time and thought have you given to choosing a career?**

Not very much time and thought
A little bit of time and thought
A fair amount of time and thought
Quite a bit of time and thought
A great deal of time and thought

**25. How much have you thought and planned about the following?**

| | Not much | A little bit | A fair amount | Quite a bit | A great deal |
|---|---|---|---|---|---|
| Talking about career plans with an adult who knows something about me | | | | | |
| Taking classes to explore what line of work I want to go into | | | | | |
| Taking classes that will help me on the job in the future | | | | | |
| Choosing a career in general | | | | | |

**26. How much have you thought and planned about the following?**

| | Not much | A little bit | A fair amount | Quite a bit | A great deal |
|---|---|---|---|---|---|
| Talking about college with an adult who knows something about me | | | | | |

| | Not much | A little bit | A fair amount | Quite a bit | A great deal |
|---|---|---|---|---|---|
| Researching college programs or courses | | | | | |
| Researching or talking with parents about how to pay for college | | | | | |

**27. Would you ask any of these people for information or help to make plans for work or further education?**

| | Definitely not | Probably not | Not sure | Likely | Definitely |
|---|---|---|---|---|---|
| Career counselors or school counselors | | | | | |
| Other teachers or adults at school (including coaches) | | | | | |
| People in a career or college I'm interested in | | | | | |
| Other adults who know things and can help people | | | | | |

**28. Which of the following people and resources have had the greatest influence on any plans you have for future work or further education?**

| | No influence or have not consulted | MINOR influence | SOME influence | QUITE A LOT of influence | A GREAT DEAL of Influence |
|---|---|---|---|---|---|
| Career counselors or school counselors | | | | | |
| Other teachers or adults at school (including coaches) | | | | | |
| Parents | | | | | |
| Siblings | | | | | |
| Other relatives | | | | | |
| Friends and/or peers | | | | | |
| People in a career or college I'm interested in | | | | | |
| Other adults | | | | | |
| Social media | | | | | |
| Other media or print resources | | | | | |

**29. Which of the following resources have been or would be helpful for future work or further education?**

| | Not at all helpful | Not really helpful | Somewhat helpful | Quite helpful | Extremely helpful |
|---|---|---|---|---|---|
| Tech Ed, Media, Business, or Family & Consumer Sciences courses | | | | | |
| Pre-Apprenticeship | | | | | |
| Information on employment opportunities for high school graduates | | | | | |

| | Not at all helpful | Not really helpful | Somewhat helpful | Quite helpful | Extremely helpful |
|---|---|---|---|---|---|
| with technical training | | | | | |
| Information on employment opportunities in the military | | | | | |
| College preparatory courses (e.g., AP courses, honors courses, dual enrollment, college in the high school) | | | | | |
| SAT or ACT tutoring | | | | | |
| Information on how to select colleges | | | | | |
| Information on how to apply to colleges | | | | | |
| Information on how to pay for college | | | | | |

**30. How far in school would you most like to go?**
Even if you don't think you will be able to go this far in school, please select how much education you would receive in an ideal world

Less than high school graduation
Earn a high school diploma or GED
Earn an occupational credential or certificate (e.g., NOCTI, NIMS, AWS credential, Journeyman
papers, ServSafe credential, etc.)
Earn an Associate degree/AA (2-year college degree)
Earn a Bachelor's degree/BA (4-year college degree)
Earn an Advanced Degree (Master's, MD, PhD, JD, or other)
Don't know

**31. Do you think it will be realistic for you to earn your ideal level of education?**
Yes
No
Don't know

**32. Whatever level of education you eventually decide would be ideal, do you think it will be realistic for you to achieve it?**
Yes
No
Don't know

**33. Have you faced any of the following academic barriers in pursuing your ideal level of education?**
Check all that apply

Low grades or poor academic preparation
Low test scores
Hard to balance academics with work

Hard to balance academics with extracurriculars
Hard to take classes to help me prepare for this level of education (classes don't have room or are not offered)
Other:

**34. Have you faced any of the following additional barriers in pursuing your ideal level of education?**
Check all that apply

Hard to pay for higher education
Hard to learn about scholarships and grants
Hard to learn about how to apply for higher education or training programs
Hard to learn about Pre-Apprenticeship or work-based learning opportunities
Hard to learn about military opportunities
My parents/family members don't want me to pursue this level of education
Need to help support family
Other:

**35. Please select the top three career clusters that are of interest to you.**
Place the career cluster of highest interest in the box labeled "1." Place the cluster of second-highest interest in the box labeled "2." Place the cluster of third-highest interest in the box labeled "3."

Agriculture, Food, & Natural Resources
Architecture & Construction
Arts, A/V Technology & Communications
Business Management and Administration
Education & Training
Finance
Government & Public Administration
Health Science
Hospitality & Tourism
Human Services
Information Technology
Law, Public Safety, Corrections & Security
Manufacturing
Marketing
Science, Technology, Engineering & Mathematics
Transportation, Distribution & Logistics

**36. Of all the careers of interest to you, what type of job or career do you think you would you MOST like to have at age 30? Please write your ideal career below.**
If you don't have a specific job in mind, please select a general career cluster or pathway of interest

**37. Do you think it will be realistic for you to work in this career?**

Yes
No
Don’t know

**38. Think about the career you would most like to have at age 30 or a career field of interest to you. How much do you already know about the following aspects of this career field?**

| | I know hardly anything about this aspect | I know a little about this | I know a moderate amount about this | I know quite a bit about this | I know a great deal about this |
|---|---|---|---|---|---|
| What people really do in the career | | | | | |
| The abilities/skills needed for the kind of career | | | | | |
| The chances of being promoted in the career | | | | | |
| The working conditions that go with the career | | | | | |

**39. What are your parent(s)’/guardian(s)’ education levels?**
Please respond for any primary parent/guardian you live with or visit on a regular basis

| | Did not finish high school | Graduated from high school or completed GED | Some higher education | Associate Degree (AA) - 2-year degree | Bachelor’s Degree (BA) - 4-year degree | Graduate degree (Master’s, MD, PhD, JD, others) | Don’t Know |
|---|---|---|---|---|---|---|---|
| Parent/Guardian 1 | | | | | | | |
| Parent/Guardian 2 | | | | | | | |

**40. Parent/Guardian 1 is my:**
Mother
Father
Stepmother
Stepfather
Grandmother
Grandfather
Other

**41. Parent/Guardian 2 is my:**
Mother
Father
Stepmother

Stepfather
Grandmother
Grandfather
Other

**42. Please list your parent(s)'/guardian(s)' occupations**

Please respond for any parent/guardian you live with or visit on a regular basis

Parent/Guardian 1 | Parent/Guardian 2

**43. Does your family own a car, van, or truck?**

No
Yes, one
Yes, two or more

**44. What is your gender?**

Female
Male
Other

**45. Does your family own a computer?**

No
Yes, one
Yes, two
Yes, more than two

**46. Which of the following best describes your family's financial situation?**

Lives comfortably
Meets needs with a little left
Just meets basic expenses
Often not enough to meet basic expenses

**47. Do you have your own bedroom for yourself?**

Yes
No

**48. With which race/ethnic group(s) do you identify?**

Check all that apply

American Indian
Asian American
Black or African American
Hispanic or Latinx
White
Other:

**Job Ranking Task**
In this section, you will be asked to think about some occupations. First, you will be asked to rank the occupations according to their general social standing - how SOCIETY views them. Then, you will be asked to rank the occupations according to what you think their social standing SHOULD be, even if society doesn't necessarily view them that way. There are no right or wrong answers.

**49. Drag each job to the box that matches the social standing it has according to SOCIETY. How do people generally view this job?**
Put the job at the top of the ladder if you think it has the highest possible social standing. Put it at the bottom of the ladder if you think it has the lowest possible social standing. If it belongs somewhere in between, just put it in the box that most closely matches the social standing of the occupation. If you don't know, put the job in the box labeled, "DON'T KNOW." At the end, you may have more than one job in each box. Make sure to completely zoom out in order to drag and drop more easily.

Drag and drop

Available categories:

Colonel in the Army
Electrical Engineer
Lawyer
Registered Nurse
Police Patrol Officer
Software Developer
Pharmaceutical Representative
Elementary School Teacher
Farmer
Trailer Truck Driver
Dancer/Choreographer
Nurse Aid
Prison Guard
Welder
Tax Collector
Office Clerk for a Hospital
Cable Box Installer/Technician
Construction Laborer

Answers:

Top Middle Bottom Don't Know

**If you have trouble advancing to the next page, please refresh the page and try again (your answers will be saved).**

**50. Now, drag each job to the box that matches the social standing that you think it SHOULD have, even if society doesn't view it that way. How SHOULD people view this job?**

Put the job at the top of the ladder if you think it SHOULD have the highest possible social standing. Put it at the bottom of the ladder if you think it SHOULD have the lowest possible social standing. If it belongs somewhere in between, just put it in the box that most closely matches the social standing of the occupation. If you don't know, put the job in the box labeled, "DON'T KNOW." At the end, you may have more than one job in each box. Make sure to completely zoom out in order to drag and drop more easily.

**51. Were the way society views the jobs and the way you view the jobs similar or different?**
You may return to the previous pages to refresh your memory of your responses. (Don't worry - this won't change your responses.)
Mostly Similar
Mostly Different
Don't remember/Don't know

**52. How do society's views on what's important for a jobs' social standing differ from what you think they SHOULD be?**
You may check more than one box for what society views as important and for what you view as important. Feel free to add your own criterion.

| | What SOCIETY views as important | What I think SHOULD be important |
|---|---|---|
| Salary | | |
| General level of education required | | |
| Specific skills required | | |
| Service to society | | |
| Other: | | |

**53. How do society's views on what's important for a jobs' social standing compare to what you think SHOULD be most important?**
You may check more than one box for what society views as important and for what you view as important. Feel free to add your own criteria.

| | What SOCIETY views as important | What I think SHOULD be important |
|---|---|---|
| Salary | | |
| General level of education required | | |
| Specific skills required | | |
| Service to society | | |
| Other: | | |

## Appendix D: Survey Respondent Demographics Pre-Data Imputation

Table D1 displays survey respondent demographic information using the dataset before it was imputed. It displays the number of respondents in each category, the percent of respondents in each category, as well as the number and percent of data missing in each category.

Table D 1: Survey Respondent Demographics: Pre-imputed Data

| | All Respondents | |
|---|---|---|
| | N | % |
| **Total** | 1,046 | 100.0 |
| | | |
| **Free/reduced-price lunch** | | |
| Not FRPL | 543 | 51.9 |
| FRPL | 291 | 27.8 |
| Missing | 212 | 20.3 |
| | | |
| **Trades Concentrator** | | |
| No | 748 | 71.5 |
| Yes | 135 | 12.9 |
| Missing | 163 | 15.6 |
| | | |
| **College Concentrator** | | |
| No | 709 | 67.8 |
| Yes | 323 | 30.9 |
| Missing | 14 | 1.3 |
| | | |
| **Non-Concentrator** | | |
| No | 458 | 43.8 |
| Yes | 463 | 44.3 |
| Missing | 125 | 12.0 |
| | | |
| **Highest parent education** | | |
| Less than high school | 67 | 6.4 |
| High school | 233 | 22.3 |
| Some college, no degree | 144 | 13.8 |
| AA | 110 | 10.5 |
| BA | 191 | 18.3 |
| Advanced | 114 | 10.9 |
| Missing | 187 | 17.9 |
| | | |
| **Grade level** | | |
| 9 | 260 | 24.9 |
| 10 | 299 | 28.6 |

| | | |
|---|---|---|
| 11 | 269 | 25.7 |
| 12 | 195 | 18.6 |
| Missing | 23 | 2.2 |
| | | |
| **Gender** | | |
| Female | 498 | 47.6 |
| Male | 494 | 47.2 |
| Missing | 54 | 5.2 |
| | | |
| **GPA** | | |
| GPA < 2.0 | 84 | 8.0 |
| GPA between 2.0 and 2.9 | 228 | 21.8 |
| GPA between 3.0 and 3.9 | 338 | 32.3 |
| GPA between 4.0 and 5 | 184 | 17.6 |
| Missing | 212 | 20.3 |
| | | |
| **Race/Ethnicity** | | |
| White | 765 | 73.1 |
| Latino | 166 | 15.8 |
| Black or AA | 48 | 4.6 |
| Asian American | 26 | 2.5 |
| Other (including mixed race) | 1 | 0.1 |
| Missing | 40 | 3.8 |

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