THE P-TECH MODEL: AN EMBEDDED CASE STUDY OF DIGITAL INEQUALITIES AND PRIVATE SECTOR INVOLVEMENT IN U.S. PUBLIC EDUCATION

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ABSTRACT

Amidst a rapidly changing educational landscape that is increasingly becoming corporatised, technology companies and wealthy techno-venture-philanthropists have demonstrated significant interest in education reform. According to the 2012 *American Revolution 2.0 report*, the US K-12 education market is valued at over $2.2 trillion. The emphasis placed on 21st century skills and the continued fiscal starvation of public education has enabled technology companies to entrench themselves in education. Technical catalysts for education reform including affordable hardware such as Chromebooks and cloud computing with Google's G-Suite have been the primary methods for technological integration in public schools. What is distinct about the contemporary reform movement is that it is being led and shaped by Silicon Valley values and interests. I refer to this contemporary movement as technocratic corporate reform.

Encapsulating the trends and characteristics of the technocratic corporate reform is IBM's Pathways in Technology Early College High School (P-TECH) model. The model, first implemented in 2011, is a STEM-focused six-year high school model built around a public-private partnership between industry, school districts, and community colleges. Notably, it was designed to serve marginalised students by providing the opportunity to earn an associate's degree at no cost. P-TECH serves as the focus of this study.

This research entails a mixed-methods embedded case study research design examining three P-TECH model schools across the country. It includes 60 in-depth interviews with private partners, educators, and students across each school, participant observations, and a multi-level social network analysis of the P-TECH network. It employs a unique theoretical framework that combines the political economy of communication and cultural studies perspectives. By adopting both perspectives this research is able to capture what is happening in education at the macro and micro scales. Utilising theories of digital capitalism and Pierre Bourdieu's theory of social reproduction this study provides an analysis of the underlying values, interests, and aims of P-TECH and its implications for the K-12 system. The micro level analysis unveils the ways in which P-TECH is influencing students' identities and aspirations. It outlines the unintended consequences of this and the subsequent risk of reproducing the very inequalities the model was created to ameliorate. This thesis ultimately maps how the US K-12 education system is being reimagined and restructured according to the agenda of technology elites.

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LIST OF ABBREVIATIONS

AS	Associate of Sciences
CSR	Corporate Social Responsibility
CTE	Career and Technical Education
CUNY	City University of New York
DACA	Deferred Action for Childhood Arrivals
DOE	Department of Education
ECI	Early College Initiative
ICT	Information and Communication Technology
NCLB	No Child Left Behind
NYCDOE	New York City Department of Education
P-TECH	Pathways in Technology Early College High School
PPP	Public Private Partnership
SNA	Social Network Analysis
STEM	Science Technology Engineering and Mathematics
SUNY	State University of New York
TNC	Transnational Corporation

Chapter 1

> "The question is not, Does or doesn't public schooling create a public? The question is, what kind of public does it create? A conglomerate of self-indulgent consumers? Angry, soulless, directionless masses? Indifferent, confused citizens? Or a public imbued with confidence, a sense of purpose, a respect for learning, and tolerance? The answer to this question has nothing whatever to do with computers, with testing, with teacher accountability, with class size, and with the other details of managing schools. The right answer depends on two things, and two things alone: the existence of shared narratives and the capacity of such narratives to provide an inspired reason for schooling."
>
> --Neil Postman, 1996

1.1 Introduction

In May of 2015 former chief executive officer of major technology company Hewlett-Packard, Carly Fiorina, announced her US Republican presidential bid. She was intending to run on a platform based on her corporate record and understanding "how the economy actually works" (Chozick, 2015). Carly Fiorina's bid for the presidency is indicative of the new configuration of political landscape and power relations where technology sector actors are gaining political influence and having a profound impact on social institutions. While the implications of this reconfiguration span nearly every sector of society, there is perhaps no other institution that is experiencing them more than education.

The diffusion of Information and Communication Technologies (ICTs) in the 1990s brought about the emergence of ICT-related education policies and initiatives designed to prepare students for the demands of the developing 'information society' labour market. The central concern underpinning these policies and initiatives has been the unequal access to the opportunities afforded by ICT use, commonly referred to as the digital divide. This concern and subsequent need to equip students with necessary '21st century' skills to compete in the labour market has offered an entrance into the organisational side of public education for technology companies. I argue throughout this thesis that technology companies are now

leading the corporate reform movement that characterises the contemporary US K-12 education system. I further argue that as technology companies continue to gain control over the corporate reform agenda they are reshaping education in fundamental ways. Resultant from this study, I distinguish the current technology-led corporatisation of education from earlier phases of the corporatisation movement by referring to this phase as technocratic corporate reform.

1.1.1 From corporate reform to technocratic corporate reform

Corporate reform of education is understood as the transformation of public education driven by market-based policies and a model of corporate culture (Saltman, 2010). Those who support the corporatisation of education believe that the quality of public education would improve if schools were required to compete with each other for students. Prominent examples of this within the US K-12 education system are charter schools and voucher systems, which are both detailed in Chapter 7. Charter schools and voucher systems increase parents' choice of schools and supporters believe that this increased competition will result in higher quality of education as they seek to secure the most students. The economic utility of education is the driving force behind the corporate reform agenda. Defining characteristics of the corporate reform movement include: privatisation, school commercialism, deregulation, vocationalism, and hyper-accountability measures including high-stakes standardised testing.

The major characteristics, including the goals and values, defining corporate education reform thus far remain pronounced in technocratic corporate reform. However, the distinguishing factors of technocratic corporate reform include which actors are involved, a distinctive approach to education reform that is inspired by "Silicon Valley ethos," and the unified focus on technology.

Technocratic corporate reform encompasses major technology companies, start-up organisations, technology focused venture capitalists, and wealthy technology philanthropists. The most appropriate term attributed to these actors throughout this thesis is

techno-venture-philanthropists. The Bill and Melinda Gates Foundation, IBM, Google, and Apple are some of the most prominent techno-venture-philanthropists in education today.

The third distinguishing factor of technocratic corporate reform refers to the cultural influences stemming from the ethos of Silicon Valley. Silicon Valley's geographic location is significant in its own right and has implications on the production, diffusion, and consumption of technology. Indeed, the area is known for its libertarianism and pervasive techno-optimism and has been referred to as a "technopolis" (Duff, 2016, p. 14) and "the heart of the information society" (May, 2002, p. 64). However, instead of referring to its specific geographic location, Silicon Valley is used here to invoke the dominant cultural associations along with the shared set of values, goals, attitudes, and practices that inhabit the technology industry. Castells (1998) described Silicon Valley as a "social milieu of innovation" (p. 107) thus making a point about the importance of acknowledging its unique social and cultural landscape. As such, the ethos of Silicon Valley can be synthesised as the privileging of disruption over sustainability, rapid knowledge diffusion, innovation, idealism, and individualism, (Rao, 2013; Levina and Hasinoff, 2017).

The approach of technocratic corporate reform is characterised by rapid innovation and big risks. It also has a heightened form of optimism surrounding technology and technology sector actors' abilities to solve all problems. Technocratic corporate reform is underlined by a belief that expertise in technology and business can be seamlessly transferred to the education domain.

Although the private sector and philanthropists have an extensive history in public education throughout the nineteenth century and this corporate reform movement has been in motion for nearly two decades, it has never been driven by a unified focus cohesively on technology with the goals of equipping students with the technical skills needed to be competitive in the labour market and boosting economic competitiveness. Until now, there has also been a distance between venture philanthropist donors and the operation of their

initiatives in education. This distance between philanthropists and their initiatives has been narrowing over time (Callahan, 2017). The initiatives being invested in have arguably not been as closely controlled and directed by philanthropists as they are today.

Investors have invested $2.3 billion between 2010 and 2015 into education technology companies looking to serve US K-12 schools (EdSurge, 2016). Rupert Murdoch made the claim in a press release that education is "a $500 billion market in the U.S. alone that is waiting desperately to be transformed" (Phillips, 2010). As this thesis will demonstrate throughout, technology companies have seized the opportunity to do just that and their rationale for reforming schools is framed as technical and economical.

1.2 Pathways in Technology Early College High School

While this phenomenon can be seen across the globe, perhaps one of the most striking examples is the US K-12 education system. Never before has the technology industry enjoyed such direct involvement in US public education as it does today. Due to the recent economic recession and striking budget cuts, the government began a campaign urging public schools to seek funding and partnerships from the private sector. The government has also been emphasising the need for students to acquire the necessary 21st century skills in order to compete in today's labour market. This, coupled with the heightened concern over the digital divide, has aided in the development of a model that is emblematic of the technocratic corporate reform movement called Pathways in Technology Early College High School (P-TECH). The P-TECH model, established in 2011 in Brooklyn, New York, is an IBM-led public private partnership (PPP) technology-centred high school model intended to serve historically marginalised youth. The partnership for each P-TECH school includes the local school district, local community college, and various industry partners. Instead of the traditional four-year high school, P-TECH encompasses a six-year high school model that gives students the opportunity to earn an associate degree in a technology related field before graduating at no extra cost to students' families. IBM refers to their P-TECH model as an

innovative high school that focuses on preparing students for careers in science, technology, engineering, and mathematics (STEM) fields and providing pathways to lucrative technology sector jobs that they say these students might not otherwise have. P-TECH has enjoyed a surprising amount of praise given its infancy and the multitude of new education models implemented each year. P-TECH was even touted by former President Barack Obama as an exemplar model of what all US education should look like (State of the Union Address, 2013). The P-TECH model and its implications, as situated within the context of this new technology sector-led stage of the corporatisation of education, serves as the focus of this thesis.

Technology and education are increasingly revered as vital to both a nation's development and individuals' life prospects. Technology and education have both been perceived to be great equalisers. However, neither education nor technology have been fully democratising. Like education, access to technology and the subsequent affordances have always favoured those who are already the most resourced in society (Ceci and Papierno, 2005; Brynjolfsson and McAfee, 2014). It is undoubtedly true that access to ICTs brings with it certain material rewards and those without access are effectively excluded from fully participating in shared political and civic life. However, a widely uncritical view of ICTs, touting them as tools for democratisation and equalisation, has led to ineffective interventions because of homogenised one-size-fits-all policies that privilege the physical ICT resources over the particular cultural, political, and economic contexts of the communities they seek to serve and because technology cannot remedy systemic inequalities. For example, in the context of education, students from rural or inner-city areas attending schools within impoverished community school districts will have unique needs and face different situational barriers than those in wealthy suburban school districts (Warschauer, 2000). Notably, investments and interest in ICT-driven education initiatives persist despite the lack of evidence to suggest they are fulfilling the intended aims. In order to understand what is driving the persistent

investment in these initiatives despite this lack of evidence, it is important to place the cultural, political, economic, and social processes and forces at the centre of the analysis.

While there is a growing contingent of scholars addressing the broader social contexts, a significant and overarching criticism levelled at research on technology and education is that it often ignores the social, cultural, economic, political, and practical dimensions of technology's impact on education (Selwyn, 2014). For those that do engage with these broader forces they often position them tangentially rather than at the centre of the analysis. In response to these critiques and calls for future research, this study situates the political, economic, social, and cultural forces underlying the P-TECH model in the context of the current technocratic corporate reform agenda squarely at the centre of its analysis.

Additionally, while scholars have offered various critiques of the corporatisation of education (Saltman, 2010; Spring, 2013, 205; Hursh, 2015; Ball, 2018) and have paid significant attention to the values underlying the corporate reform movement, the role of technology companies in particular has not been extensively examined. Because the current landscape of the corporate reform agenda is being led by technology companies it is important to be aware of the capacity of technology companies to reshape the education system at a structural level and also identify their influence in students' lives. The P-TECH model is a particularly appropriate example for developing an understanding of these implications as it is emblematic of the technocratic corporate reform movement.

In all, this study recognises technology and the technology industry as social and cultural forces. As such, it is essential to examine the underlying values and interests shaping both technology and the technology industry. By unveiling the values and interests underpinning the P-TECH model this thesis demonstrates how IBM through P-TECH has the capacity to transform the way we think about the purpose and value of education. This study is centrally concerned with the interrelationships between structural and micro processes in order to develop a rich understanding of how technology-driven education initiatives such as P-TECH

are affecting the social, political, and economic conditions of the education system and students' everyday life.

1.3 Research questions

This thesis employs a mixed-method embedded case study approach looking at three purposively sampled P-TECH model schools across the US in order to ultimately understand the implications of the emerging technocratic corporate reform movement.

1.3.1 Motivations and goals of study

The initial motivation at the outset of this study was an interest in developing an understanding of the ways in which ICT-driven education initiatives are impacting inequality. While the study's refined research questions outlined below do not necessarily engage with this initial motivation directly, issues of inequality and social inclusion remain as central concerns throughout this study. Indeed, the study's overarching question is: How is the P-TECH model impacting issues of inequality?

Utilising P-TECH as the focus of analysis, this study sets out to answer the three research questions outlined below.

1.3.2 Refined research questions

The following research questions guide this study:

RQ1: How are the values and interests underlying the P-TECH model influencing the current K-12 system today?

This question captures what is happening at the structural level. It was inspired by an interest in understanding why the P-TECH model received substantial and high profile praise just two years after being implemented. This emerged from an understanding that many new education models and initiatives are implemented each year but do not enjoy the same level of praise. Answering this question may help illuminate why investments in these initiatives persist despite the lack of evidence to support they are achieving their aims. By unpacking the interests and values underlying P-TECH and assessing them against those that are

shaping the current K-12 system, evidenced by educational policies and trends, it becomes clear how P-TECH was able to flourish. Ultimately, this question situates the P-TECH model within the broader K-12 system and unveils the competing and aligning interests at play.

RQ2: What are the consequences of P-TECH's promulgation for its stakeholders and the K-12 system?

This question is meant to serve as a bridge between the study's first and third questions. Where the first question is concerned with gaining an understanding of the broader context in which P-TECH is situated, this question focuses on P-TECH as an institution and the implications of P-TECH specifically on the education system and its students. The focus was largely on structural forces for the first question whereas the second research question is concerned directly with P-TECH, as an entity operating within the system, looking outward and inward. Here, the distribution of benefits and costs of the model are examined which allows me to theorise what the broader consequences are for all of P-TECH's stakeholders and the K-12 system. The multitude of institutional and individual level phenomena are explored in depth through this question.

RQ3: How does the P-TECH model shape students' identity and career aspirations?

This last question captures the implications of the P-TECH model at the micro-level. As this thesis will show, schools have the ability to shape students and influence their future trajectories in fundamental ways. This question unpacks the mechanisms through which the influence occurs and what this is likely to mean for the students in terms of life chances and social inclusion.

The rationale and further explanation of how each of these questions are operationalised are detailed in Chapter 3. The research questions are designed according to scale ranging from macro- to the micro-level. They were also developed with the study's unique theoretical framework and research design in mind, which are both introduced below.

1.4 Outline of research design and theoretical framework

The present study employs a mixed-methods embedded case study research design that provides an understanding of the P-TECH model and its implications at both the structural and micro-level. The embedded case study encompasses three different P-TECH model schools in three culturally and geographically distinct regions of the US. Each school represents a different type of P-TECH school model including a 'within-the-school' structure where there is a separate P-TECH program embedded within an existing high school, a stand-alone structure where the entire school operates solely as P-TECH, and a charter school version. Each school site also follows a different career focus meaning the students are being trained for different careers including information systems, advertising, and construction and advanced manufacturing. Finally, the schools are also in different years of operation. The variation is meant to capture the boundaries of the model in order to develop a more holistic understanding of P-TECH.

The methods employed and data collected for this study include a social network analysis (SNA) of the P-TECH network, participant observation of classrooms and various P-TECH planning meetings, document analysis, and 60 semi-structured in-depth interviews with P-TECH industry partners, educators, higher education partners and students. The rationale and further detail for the research design is laid out in depth in Chapter 3.

This thesis is situated within the field of communication and located in the growing body of research on technology and the corporatisation of education. Using the P-TECH model as the unit of analysis, my research specifically explores the IT industry's role in the restructuring of public education and the implications particularly regarding issues of inequality from the macro to the micro. This is accomplished through the study's theoretical framework that combines approaches from the political economy of communication and cultural studies. Where a political economy perspective is concerned with structural relations of power organising society, cultural studies is focused on individual social agency and

resistance to dominant forms of power. Both need to be considered in order to answer the study's research questions because neither capture how what is occurring at the macro- and micro-levels are interrelated and influencing one another.

Research surrounding education and technology seems to be primarily concerned with the ways in which technology can enhance learning outcomes, pedagogy, or 'disrupt' learning environments. This research is dominated by instrumentalist accounts of technology use in education where scholars focus on the technological artefacts without much recognition of the broader political, economic, and cultural processes informing their delivery and consumption. The field of communication has contributed greatly to widening the research scope for ICTs in education. Those drawing from cultural studies in particular have done so by engaging with the social and ideological nature surrounding popular topics such as media production in the classroom, participatory culture, digital inequalities and digital literacy (Postman, 1996; Jenkins, 2006; Buckingham, 2007; Livingstone, 2012). Those adopting a political economy approach within media and communication have highlighted the commercial and commodification aspects of technological integration in education (Schiller, 1999; Buckingham, 2005, 2007). Moreover, media and communication scholars have contributed greatly through research that challenges the assumed relationship between technology and socioeconomic progress (McChesney, 2013; Schiller, 2014; Fuchs, 2017). Despite the significant contributions made from media and communication scholars, there is still a need for more literature that disentangles the social, economic, political, and cultural nature of technology in education. By doing this, there can be more effective policies guiding these initiatives and enable more productive approaches to technology in education in general.

This study adds to these contributions by accepting Manuel Castell's conception of contemporary society as the 'network society' which he argues, involves the narrow interdependence of social, political, and economic forces (Castells, 2009). This means any

assessment of any prevalent phenomenon occurring in the network society must attend to the social, political, and economic processes at play.

This study is informed by two dominant theories. The first is the theory of digital capitalism and the second is Pierre Bourdieu's (1977) theory of social reproduction. Digital capitalism is used as an explanatory tool for understanding the role of P-TECH, the forces enabling its creation and expansion, and its implications. Bourdieu's theory of social reproduction is used to understand the ways in which P-TECH is influencing students' identities and aspirations as well as the benefits and barriers of the model. By utilising Bourdieu's concept of habitus and extending it to apply to each school within this embedded case study, I ultimately demonstrate how institutional habitus plays a key role in shaping students' trajectories and sense of place. Taken together, the study provides a holistic understanding of the contemporary US K-12 education system by examining the IT industry's influence from the structural level to the everyday.

Because P-TECH, like many other ICT-centred education initiatives, is claimed to alleviate issues of digital inequality and improve life prospects for marginalised groups this study situates P-TECH within an analysis of unequal power relations and engages directly with the conflicts generated by these relations. Overall, this thesis answers calls for more politically aware and sociologically grounded approaches to technology and education that connects the role of technology to larger social processes (Selwyn and Facer, 2013; Selwyn, 2017). Ultimately, this study, through P-TECH, interrogates who is controlling the agenda within the corporate reform movement and assesses how the benefits are distributed across all partners and students as the intended primary beneficiaries of the model. The findings of this study highlight the implications of P-TECH and the technocratic corporate reform movement on the US K-12 education system in terms of its structure, value, and aims.

Three critical arguments are presented throughout this thesis. I first argue how the IT industry is restructuring the public education system according to its interests and values.

Using the findings from this study, I theorise what this potentially means for education as a whole by arguing how the current corporate reform movement has intensified its value and purpose in society to be instrumental and economically driven. Another major argument presented in this thesis is how IBM is likely set to gain more than potential profits from the education sector. The success and rapid expansion of P-TECH enhances IBM's reputation and credibility regarding their ability to solve educational issues. As evidenced by Carly Fiorina's bid for the 2016 presidential race, this credibility and enhanced reputation translates to more political influence and decision-making power regarding education policy for IBM. P-TECH ultimately represents the reconfigured relations of power in education and policymaking today where the technology sector is shaping the agenda. The final argument put forth in this thesis is that P-TECH is influencing students' future trajectories which have substantial consequences that reflect the possible reproduction of existing inequalities. Embedded in these main arguments is an analysis of the overall benefits and costs of the P-TECH model. Through its unique framework and subsequent findings, this thesis makes meaningful contributions to scholarship and policymaking.

1.5 Contributions

Situated within the field of communication, the primary scholarly contribution of this thesis is the extension of existing scholarship and its theoretical framework that brings together two traditionally clashing schools of thought, the political economy of communication and cultural studies. There has been little research in the field of communication on the role of the IT-industry in education and the implications in terms of inequalities. For those that have contributed to this research area, education is either treated as a tangential topic or the focus is primarily on higher education. In contrast, this study positions education at the centre of the analysis and looks at the K-12 system. In all, this thesis contributes to the extension of current corporatisation of education scholarship by adopting a multi- level analysis enabled by its unique theoretical framework. The bridging of

these supposed antagonistic theoretical perspectives will highlight the ways in which they are actually complementary approaches and can encourage other communication scholars to reconsider this historical divide. Taken together, these two approaches fulfil a need in current research for multi-level analysis of technology, education, and inequality while attending directly to the social, cultural, political, and economic nature of technology in education. By moving beyond instrumentalist accounts of technology in education and situating technology "in distinctly political terms of societal conflict and struggle over the distribution of power" (Selwyn and Facer, 2013, p. 5) this study provides a meaningful account of the implications of technology in education for issues of equity and social inclusion.

This thesis also makes practical contributions through policy suggestions that are intended to help ensure the affordances of the P-TECH model and related ICT education initiatives based on public private partnerships can be realised. As technology and the IT industry continue to be perceived as social and cultural forces capable of solving societal issues their presence and influence in public institutions such as education will continue to grow. In order to fully understand the implications of this increased influence from the technology sector over public institutions it is crucial that the underlying values and interests are assessed closely. Dominant discourses in STEM education policies suggest these initiatives are motivated by economic competitiveness and closing the achievement gap between marginalised students. Indeed, policy reports are replete with statements regarding the problem of underrepresentation in STEM (U.S. Department of Education, 2007; National Research Council, 2009a) and how advancing STEM performance will translate into economic benefit to the state and bolster the country's global economic position. What is missing are meaningful context-driven policy suggestions based on local accounts while also considering the broader social forces in which ICT-driven education initiatives operate. By analysing the underlying values and interests of the P-TECH model alongside its challenges and benefits, I am able to put forth applicable policy recommendations in the conclusion of

this thesis. If the students are to enjoy the opportunities and benefits of the P-TECH model then safeguards need to be in place to ensure an equitable distribution of benefits across P-TECH partners and students.

As P-TECH continues to expand and similar IT-industry led education initiatives arise, researchers and policymakers could benefit from a better understanding of the specific needs of those they seek to serve and the local contexts in which the initiatives operate. Ultimately, the data and findings emerging from this thesis offer practical solutions for IT industry- led education initiatives.

Every year many new technology-related education models and initiatives are proposed throughout the country. Similar to the very few startups in Silicon Valley that are successful, most of these models and initiatives either fail to be implemented or are not sustained. Even fewer enjoy a notable level of national publicity and praise. IBM's P-TECH model is the equivalent of a successful startup for education.

P-TECH presents a complex case with promises and consequences for students and the education system at large. It is recognised as a socio-technical phenomenon that represents the current reconfiguration of policy spaces and relations of authority across networks of education, government, and the technology industry. It illuminates the privileged role technology sector actors have in these policy spaces where they enjoy extensive policy influence.

This thesis demonstrates how P-TECH gives rise to what I have identified as the technocratic corporate reform phase of the current corporatisation of education in the US. As the technology sector continues to gain prominence in public education, it becomes more important to understand how they are representing public interests. This thesis enables this understanding in the context of P-TECH by unveiling how the decisions behind P-TECH are made, who benefits most, and what the potential consequences are for its students, IBM, and the education system.

1.6 Thesis structure

Chapter 2 sets out the theoretical framework of the thesis and an overview of the relevant literature addressing the different themes of this research including digital inequalities, and technocratic corporate reform. It is organized by the two dominant frameworks for the study: political economy of communication and cultural studies. Included under the frameworks the primary theories guiding this research including digital capitalism and Bourdieu's theory of social and cultural reproduction.

Chapter 3 provides the rationale for the study's research design including its methodologies and analytical approach. It begins with an explanation of how the research design is derived from the constructivist paradigm and employs naturalistic inquiry meaning that it adopts the understanding that social reality is understood to be a subjective creation or socially constructed (Lincoln and Guba, 1989). The chapter continues with an overview of the rationale for choosing P-TECH and the criteria for selecting the different sites for data collection. The majority of the chapter is made up of an extensive discussion on the study's methods and data sources. The chapter concludes with the ethical considerations and the use of reflexivity.

Chapter 4 is the study's first data chapter and presents the SNA results. By unveiling the strategic alliances between IBM and government, this chapter contributes to answering the study's first research question regarding the influence of the values and interests underlying P-TECH at the macro-level. The majority of the chapter is dedicated to an in-depth discussion of the interrelationship between the technology industry (through the specific P-TECH partners) and the State. Using digital capitalism as an explanatory force this chapter details how P-TECH represents the progressively blurred demarcations between public and private sectors. The findings are used to theorise what the consequences are for the education system. The analysis also highlights the reciprocal ties between individuals from the technology sector, government, and public schools, which is used to provide an

understanding for why P-TECH received such an extensive amount of media attention, praise, and successful rapid expansion.

Chapters 5, *6* and *7* include each school site making up the embedded case study. They each provide rich contextual data but there is some variation in terms of what is emphasized. Each includes a site profile, geographic influences, and the role of technology at each school. Beyond these connections, each chapter contributes something different but each is constructed based on the study's research questions. These differences are briefly highlighted below.

Chapter 5 presents the data for the first site in this embedded case study, Kettler High School, which represents the 'within-the-school' structure of P-TECH model. Kettler most closely aligns with the initial intent of P-TECH with a career focus on information systems and the goal of providing a pathway for underserved students into stable and lucrative technology sector careers. The chapter discusses tensions between P-TECH's commitment to remaining "value-free" and the lack of engagement with the social struggles its students face which is important for P-TECH's mission and achieving its overall aims. The data from this chapter help to answer research questions one and three.

Chapter 6 presents the data for the second school, ACME Tech. The career focus of this New York City P-TECH school is media and advertising. They dominant themes of this chapter include the peripheral role of technology at the school and how an acute awareness of social issues embodied by educators and students influences the culture of the school and how this institutional habitus mitigates the corporate conditioning and influence seen at other P-TECH schools. This chapter contributes to primarily to the first two research questions.

Chapter 7 presents the data for the third and final school site within this embedded case study. C&C Academy is a construction focused P-TECH school representing the charter school version of the P-TECH model. The key themes of the chapter include: The data for

this chapter is the most revealing for answering the study's final research question regarding P-TECH's influence on students' identity and aspirations.

Chapter 8 provides a synthesis of the study's findings organised by the research question the data serves to answer.

Chapter 9 is the concluding chapter of this thesis. This chapter maps the study's theoretical contributions alongside the main understandings that have emerged from this research. Contributing to the practical goals of this research, this chapter puts forth the policy recommendations motivated by the observed barriers and successes of the P-TECH model so far. Based on the study's findings, the chapter outlines the limitations of the study then concludes by proposing direction for future research. Taken together, this details the shifting landscape of the US K-12 education system that is being increasingly led by the technology sector. This thesis ultimately serves as a useful guide to consider the consequences in this next phase of the corporatisation of education.

Chapter 2 Literature Review

2.1 Introduction

Economists and technology sector ideologues purport that the combination of digital technology and unfettered, free market capitalism is key to solving many of the world's social problems. This combination is believed to result in abundant prosperity through the creation of lucrative and stable jobs and a system supporting innovation. Digital technologies and unfettered capitalism are also believed to bring about more equality and overall social progress. On their quest to make the world a better place major technology companies have set their sights on reforming public education system.

This chapter develops the theoretical framework guiding this study through the existing literature related to the dominant themes of this study. Through its unique framework encompassing the political economy of communication and cultural studies, this thesis is informed by three theoretical perspectives put forward by Manuel Castells, Dan Schiller, and Pierre Bourdieu, a sociologist who has significantly influenced cultural studies. Specifically, the three theoretical lenses applied include the network society (Castells, 1996; 1997; 1998), the theory of digital capitalism (Schiller, 1999) and the theory of social reproduction (Bourdieu, 1977). The chapter is organised by the two overarching perspectives of political economy of communication and cultural studies. The three theoretical orientations are explained in detail throughout this chapter alongside the dominant themes of the study.

2.2 Technology, society, and inequality

In the broadest sense, this thesis is concerned with the interrelationship between technology, society, and inequality. In order to understand the consequences of the P-TECH model, from the macro to the micro, it is important to have a sense for the ways in which technology and society interact. The literature on the integration of ICTs throughout society is strongly partisan. Technology is primarily characterised in either utopian or sceptical terms. Those providing optimistic accounts of technology's role in society believe it to be a

democratising force (Benkler, 2006; Shirky, 2008; Watson, 2009). The underlying thesis in techno-optimistic perspective is that for the first time in history, global cooperation is not controlled and led by governments or institutions. Instead, the tools for global cooperation are held by all.

Academic criticism has tempered optimistic accounts of technology's role in bringing about positive social change in society today. Those who possess a more critical view warn that technology is strengthening an advanced form of capitalism and exacerbating existing inequalities (Fuchs, 2008; Schiller, 2014; Morozov, 2011; McChesney, 2013). Where techno-optimists assert that the Internet contributes to a more plural and diverse public sphere, critics emphasise the uneven diffusion of ICTs and the resulting exacerbation of existing inequalities (DiMaggio and Hargittai, 2001). This uneven diffusion of ICTs is the root of digital inequality which is a central concern of this thesis.

2.2.1 Digital inequality

The development of a global information society and the rapid diffusion of ICTs have worked to produce new sets of skills required for individuals to possess if they are to compete and participate in society. These new sets of skills individuals must acquire today are broadly classified as 21st century skills and digital skills. Due to the strikingly uneven diffusion of ICTs over the last few decades, those without access have lacked the opportunity to develop these skills and are further marginalised by not being competitive in today's labour market. Ultimately, this uneven diffusion has had a profound impact on determining who is able to fully participate in society and who is not. As the network society has evolved, long-standing forms of inequality have been exacerbated while new forms have emerged. Digital inequality is the most prominent new form of inequality that has significant implications for individuals' life chances.

The need to understand the implications of the uneven diffusion and further consequences of not having access to ICTs has resulted in an extensive amount of scholarship and policies

focusing on what has been established as the digital divide. Earlier conceptions of the digital divide were defined by the haves versus the have-nots which is to say those who have access to computers and eventually the Internet and those who do not (DiMaggio and Hargittai, 2001). As the internet has matured and the network society continues to evolve, it has become clear that the binary conception of the digital divide fails to capture its various layers and complexities which limits any analysis of the new forms of inequality that have emerged from the advent of ICTs. For instance, beyond gaps in access, individuals also possess different quality of access, varying levels of digital skills, and online participation to name a few. In order to account for this, scholars have put forth and now adopt the concept of digital inequalities (Selwyn, 2002; Hargittai, 2010; Witte and Mannon, 2010; Robinson et al., 2015).

Much of the digital inequality scholarship covers specific aspects of digital inequality relating to access, usage, skills, and self-perceptions. While some recent data illustrate how certain gaps have narrowed in terms of access and use, others have shown how crucial differences remain, especially with respect to race and education (Hargittai, 2003; Mossberger, Tolbert, and Stansbury, 2003; Warschauer, 2004; DiMaggio et al., 2004). It has been argued that differentiated ICT use influences access to social, cultural, political, and informational resources suggesting it is crucial to unveil how different social groups utilise technologies (Mesch, Mano, and Tsamir, 2012). While the intricate processes involved with digital inequality at the level of usage and skills are critically important to advancing understanding of digital inequality, this thesis focuses on its role alongside more traditional forms of inequality and is concerned with the broader implications pertaining to life trajectories and prospects specifically for P-TECH students. The importance of digital inequalities is evident across micro- and macro-level domains and intricately tied to gender, race, class, and social capital (Robinson et al., 2015).

As evidenced by the many digital divide initiatives and policies, widening access to all socio-economic and ethnic groups has become a political priority. The P-TECH model is

emblematic of this as it represents one of many techno-venture-philanthropy initiatives based on widening access. The concept of and issues relating to digital inequalities are threaded throughout each of the study's dominant themes which organise the remainder of this chapter.

2.3 Political economy of communication

Making up one half of this study's overarching theoretical framework is the political economy of communication (PEC). The PEC is a subdisciplinary framework that engages the social, political economic, cultural, and technical dimensions of communication. It is characterised as the study of structures for the production, distribution, and consumption of media and communication industries under capitalism. The PEC is centrally interested in how power, stemming from media industries and ICTs, is produced, distributed, used, and exchanged and how these aspects are related. Vincent Mosco (2009) defines the PEC as "...the study of the social relations, particularly the power relations, that mutually constitute the production, distribution, and consumption of resources, including communication resources" (Mosco, 2009, p.2*).* The PEC is a subfield within the field of communication and concerns itself with structural relations of power constituting the organisation of society through the means of production, distribution, and consumption of ICTs.

A central characteristic of the PEC approach is its emphasis on historical processes which is essential to understanding how media systems and the patterns of integration of ICTs operate and affect social structures today. Through this attention on historical trajectories of media systems and ICTs in their analyses, PEC scholars continuously demonstrate how they are intricately tied to and resulting from a deeply contested history. As such, rather than simply describing P-TECH within the current context of education, this study is committed to situate P-TECH and the subsequent themes within a historical context to fully understand how P-TECH came to be and how it connects to broader political, economic, cultural, and social forces.

Social class is a chief interest for the PEC. It posits that the "elite" have a disproportionate amount of power through their ownership and control over social formations, incorporating communication infrastructure, which includes the IT industry. As such, the PEC is primarily concerned with power at the corporate and state levels. The core understanding of the PEC is that a group of capitalist elites have a disproportionate amount of power that has been enabled by their ownership and control over the communication infrastructure (McChesney, 2000; Mosco & Schiller, 2001; Mosco, 2004; Hindman, 2009; Castells, 2009; McChesney, 2013). The dominant theme characterising current PEC scholarship is its focus on the transition from American post-war hegemony to global communication systems where production and distribution is controlled by transnational corporations (TNCs) and propelled by the proliferation of ICTs (Thussu, 2000; Madikiza and Bornman, 2007).

The political economy of communication literature primarily covers the integration of media systems and the global political economy with particular emphasis placed on big business and the media elite in terms of shifting relations and forms of power (Braman, 2004; Mosco, 2008). This study is situated within existing PEC literature through its emphasis on the influence and control of IBM, a longstanding icon of US dominance in high tech, and the implications of their P-TECH model which serves as an acute example of the integration of the commercial sector into public institutions. Although this study has a domestic focus, the trends assessed, and implications outlined, have global relevance as similar trends have been noted across other education systems. Furthermore, the global significance of P-TECH will grow as IBM seeks to expand the model internationally.

Mosco (2009) describes three main entry processes to the PEC: commodification, spatialisation, and structuration. This study utilises commodification and structuration in particular as they are the most relevant for education today. Commodification entails the shift of goods and services from being valued for their utility to being valued for their exchange value (Mosco 2009, p.129). Through the commodification process the value of products is

determined by what they bring to the marketplace rather than their ability to meet individual and social needs, although these may not be mutually exclusive. Mosco (2009) asserts that communication practices and technologies are key contributors to the commodification process throughout society that results in greater control for companies over the process of production, distribution, and exchange (p.11). Moreover, ICTs, through modes of surveillance, have enabled companies to measure and monitor what customers buy which has increased companies' profits and efficiency (p.11). Commodification is also important for better understanding communication practices and institutions. For instance, the 1980s era of deregulation, in response to a general economic decline, resulted in the privatisation of telecommunication institutions, liberalisation of all communication markets and the commercialisation of media programming in places where there was little evidence of commodification previously (Mosco, 2009, p. 11). Commodification affects all domains of life. Many services that were once provided or heavily subsidised by the state are increasingly being privatised and requiring purchase. Scholars have been drawing their attention to the commodification of public goods and its association with rising inequality (Marquand, 2004; Grover, 2009; Adair, 2010; Grusky, 2016). This has significant consequences for education.

As the data presented throughout this thesis will support, education, at all levels, has been progressively commodified. This is evidenced by the language that groups such as the Organisation for Economic Cooperation and Development (OECD) use to describe higher education institutions, such as "education product" providers (OECD, 2017). Mosco and Schiller (2001) draw connections between North American Free Trade Agreement's (NAFTA) definition of education within the context of the corporate restructuring of education underway. Education is redefined as a "private good" that benefits the "student/consumer" instead of a "public service" meant to benefit society (p.174). Most of the literature focuses on higher education, but commodification is becoming more applicable

towards primary and secondary education, making it relevant to this study.

The trend toward the commodification of education is further supported by the attempt from the corporate reform agenda seeking to increase the quality of public education through school voucher programs and charter schools which is seen to promote competitiveness and offer more choices for parents in determining which school is best. Indeed, higher education and now the K-12 system have become marketplaces where students and families are treated as consumers. Parallels can be drawn between the commodification trends in the 1980s with what is happening now in education. The increase in IT sector involvement in the US public education system represents a liberalisation of the market enabled by both the shrinking of public funds and active promotion from the state to have public schools rely more on private resources.

The entry process of structuration is inspired by Marx's (1973) view that individual social action occurs under conditions determined by the structures within which the action takes place. The entry process of structuration is meant to prevent political economists from providing economically essentialist accounts by placing governmental institutions and corporations at the centre of the analysis. This entry process is drawn from Anthony Giddens' highly influential theory of structuration which reconciles the dichotomy of structure and agency. As a relational construct, structuration looks at the interactions between structure and agency. Rather than being mutually exclusive from one another Giddens argues that they are interconnected and should be treated as mutually constituting (Giddens, 1984). While social action is dependent on individual agency, it is also enabled and constrained by social structures. Instead of treating agency and structure as opposed to one another, structuration theory emphasises the need for analyses to focus on the ways in which elements of both are prevalent in shared social practices (Giddens, 1984). As such, structuration as an entry point for the PEC involves incorporating agency and social practice into the analysis of structures. Mosco (2009) argues that hegemonic control is sustained through structuration thus making a

structuration focus particularly important in understanding the relationship between political economy alongside issues of class, gender, and race. Market liberalisation has led to an increase in the disparity between social classes having radical consequences on the "network society" (Castells, 2009). Indeed, class, race, and gender are central to a PEC perspective and structuration is key in understanding what forces are propelling existing issues concerning digital inequalities.

The next entry point to the PEC, spatialization, is complex and wide in scope. For the purposes of this project, "spatialization" will be used as Mosco defines it, "the process of overcoming constraints of time and space in social life" (2009, p.157). Directly related to digital capitalism, Schiller notes that digital capitalism "is free to physically transcend territorial boundaries and, more important, to take economic advantage of the sudden absence of geopolitical constraints on its development" (p. 205). While this thesis has a domestic focus, the global geopolitical relations directly influence how ICTs are adopted and used in the U.S. making this notion of spatialization relevant for this study. Additionally, spatialization is critical to the study of IT industry-led private public partnerships because it is concerned with the "institutional extension of corporate power in the communication industry" (Mosco 2009, p. 158). Furthermore, through spatialization, we are able to understand the significance of corporate concentration on public education, which gives companies control over the production, distribution, and exchange of communication. While there has been an emergence of educational technology companies, there is still a relative monopoly that exists. The concern here for PEC is that monopolies or corporate concentration restricts the flow of information and goods.

There is an long lineage of scholarship from education that adopts a political economy of education and schooling approach (Carnoy, 1972; Molnar, 2006; Ball, 2007; Burch, 2009; Lipman, 2011; Apple, 2013; Hursh, 2015; Molnar, 2018; Morgan, 2018), and a growing number of studies from this perspective that focus on the technology industry in education

(Selwyn, 2007, 2013; Williamson, 2015, 2016; Saltman, 2016; Molnar et al., 2017). However, there is a surprisingly limited amount of research on education and technology from a PEC perspective. The few that have looked at education almost exclusively focuses on higher education (Schiller, 1999) or treat education as a tangential topic embedded within a broader project (Schiller, 1999; Mosco and Schiller, 2001). Considering its size, ethos, and particularly the dramatic ICT related shifts currently underway, it is important that communication scholars draw their attention to the US K-12 education system. Moreover, a PEC perspective is now needed if we are to understand the implications of the continued commodification of education reaching primary and secondary education systems. The technology sector as one of the key drivers behind the progressing commodification of education makes a PEC perspective most valuable for researching the implications. In addition to the need for PEC research that focuses on the K-12 education system, there is also a need for multi-scaled analyses. A common critique levelled against political economy is that the analyses are often economically deterministic (Chakravartty and Castañeda Paredes, 2002). This study wards against this through its use of structuration and integration of cultural studies that complements the political economy approach by capturing what is happening at the micro-level.

2.3.1 Network society

There are many terms that have been applied to conceptualise contemporary society. Some of the most prominent concepts used to characterise modern society include: post-industrial, post-Fordist, post-modern, knowledge society, and the network society (Castells, 2004; Garnham, 2010; Webster, 2014). The common central feature across current conceptualisations put forth is that information is the distinguishing feature of modern society (Webster, 2014). Information has redefined previous economies that were built on mass industrial production bringing about a global information economy. As such, information—in its many forms—has become the most important input and output of the information

economy.

Out of the various convincing conceptualisations put forth, this thesis adopts Manuel Castells' concept of the 'network society'. The network society "is a society whose social structure is made of networks powered by microelectronics-based information and communication technologies" (Castells, 2004, p. 3). It is the understanding that society's social structure is now organised (not determined) by networks (Castells, 2009). Castells defines a network as a set of interconnected nodes (Castells, 2015). Put differently, the connection between nodes create a network. The importance of nodes depends on the amount of relevant information they have access to that contribute to the goals of the network. Despite their level of importance in the network, Castells argues that all nodes are necessary for the network's performance (Castells, 2015). The importance of a node to a network, based on the information they carry, translates into value and power in the network.

The network society has resulted from the convergence of three historical processes including: the information technology revolution, the restructuring of industrial economies adjusting the opening up of markets, and the political and cultural movements during the 1960s (Castells, 2004: 15). To be sure, networks have always played an important role in social life, however, it is because of ICTs that networks now occupy a centrally organising position in society. In all, industrialism has been 'subsumed by informationalism' where all human activity follows a networked logic (Castells, 2004, p. 8).

Castells' theory of the network society is developed through his trilogy *The Information Age: Economy, Society and Culture* which includes *The Rise of the Network Society* (1996), *The Power of Identity* (1997), and *End of Millenium* (1998). He developed the theory and its implications further in his subsequent book *Communication Power* (2009). Despite presenting a grand narrative, Castells grounds his claims in empirical research. He uses these observations to emphasise the importance of cultural contexts and of culture when making sense of the network society. Castells (2004) claims that the global network society is highly

malleable to social forces, culture, politics, and economics.

Highlighting the interconnectedness between culture and the political economy Castells claims, “The diversity of cultural contexts where the informational economy emerges and evolves does not preclude the existence of a common matrix of organizational forms in the processes of production, consumption, and distribution” (Castells, 1997, p. 151). This move into the network society, which is driven by ICTs and organised through networks, would not be able to progress without a common systemic matrix of organisational forms used to guide the process of production, distribution, and consumption. However, particular attention needs to be paid to the different cultural contexts driving and shaping institutional goals and practices. Castells argues that culture materialises in organisational logics which further influences institutionalised relations of power and authority (Castells, 1996). This further supports the relevance of a network society understanding for this study as it offers a framework for attending to the cultural and institutional components of society.

The network society involves changes that affect all aspects of life, from economies to notions of selfhood and identity. Castells discusses identity in terms of social movements which are understood to have transformative impacts on the values and institutions of society. Identity is presented as a form of power and marked by power relationships. Castells (1997) argues "In a world of global flows of wealth, power, and images, the search for identity -- collective or individual, ascribed or constructed -- becomes the fundamental source of social meaning" (p. 3). While this thesis does not assess identities as they relate to social change it does examine the ways social structures are influencing students’ identity construction.

Contributing to this study’s concern with inequalities, Castells (2009) attests that the network society is organised by a binary inclusive/exclusive logic of the network which states that those who do not have access to or are not able to contribute to the goal of the network society are excluded. This social binary perspective has received a significant amount of criticism for being deterministic and furthering the misguided understanding that a

lack of access equates to one being irrelevant in society resulting in an automatic decrease in life chances (Warschauer, 2004; Webster, 2014). While the notion of the binary logic of the network is undoubtedly deterministic as it is not able to account for the various ways those without access can have full participation and inclusion, it is still useful in understanding the implications of digital inequalities. Mark Warschauer (2004) contends, there is no binary divide but those who do not have access to ICTs and the subsequent resources that come along with them are secluded in many ways and further marginalised as society continues to be increasingly dependent on them.

There are two defining features of Castells' theory of the network society from which this present thesis departs. The first is his claim that hierarchies are being pulled down within TNCs asserting that power is devolving toward information workers thus dramatically empowering entrepreneurial employees rather than individual capitalist elites and the managerial class (Webster, 2014, p. 112). While Castells does not suggest that TNCs no longer exist he does contend that they occupy a less centralised position in the network society. This study demonstrates through its social network analysis how traditional hierarchies are still prevalent in the network society with power still concentrated at the top. This thesis further challenges the claims regarding an overall empowerment for informational labourers in the network society. Relatedly, the other feature of the network society in which this thesis departs is the diminishment of class inequalities in favour of an emphasis on the transformative and meritocratic capacities of informational labour. This is questioned given the overwhelming evidence of sustained inequality. Indeed, the fact remains that those in the most privileged positions continue to dominate. This study positions class inequalities firmly in the centre of its analysis and demonstrates how, in the network society, existing inequalities persist and deepen in various ways.

2.3.2 Digital capitalism

Capital in the network society is represented by silicon and bytes as opposed to production lines in factories during the industrial age. Intangible capital such as big data is what drives the information economy. Overall, it is information and services rather than physical products that dominate the economy in the network society. It operates through the Internet, which is credited for bringing about the network society. In the global economy, the Internet, from its facilitation of business transactions to high profile and high dollar technology initial public offerings (IPOs) such as Google, Facebook, and Twitter, is ubiquitous. All of this represents the workings of digital capitalism, the concept used to describe the contemporary political economy (Schiller and Yeo, 2017).

According to Dan Schiller (1999), digital capitalism represents the shift in cyberspace from being created and used by the military-industrial-university complex, where the government-funded project ARPANET was created for strategic military communication purposes by both government agencies and universities, to widespread commercial use that serve corporate users today. The US serves as the locus and leading centre of digital capitalism. The thesis of digital capitalism is that there has been a distinct shift in the global political economy that now caters to corporate interests through market-driven communication policies evolving out of the 1980s (Schiller, 1999). Digital capitalism, with its focus on whose interests and values are being served, is important for answering this study's first research question which asks how the values and interests underlying the P-TECH model influence the US K-12 system.

The transformation towards digital capitalism can be credited to several major events. The first is the crisis of Fordism in the mid-1970s in conjunction with a welfare state failing to sustain itself due to the social repercussions of Fordism and the ushering in of the microelectronic revolution. The next major event that helped to propel the emergence of digital capitalism is the deregulation era of the 1980s, which facilitated financial liberalisation and globalisation, allowing an influx of capital from all over the globe. The

ongoing liberalisation of the US market released the original sponsors of Internet technology, a military contract and the consulting firm called Bolt, Baranek, and Newman (Schiller, 1999, p. 11), opening up the Internet to commercial exploitation. This, in conjunction with globalisation and the new flows of finance, funded the incoming information technology revolution of the 1990s where a new pattern of accumulation emerged based on information. It is these two different patterns of accumulation, Fordist and information-based accumulation, that has enabled the context from which digital capitalism could emerge.

These historical processes are important for understanding prominent characteristics of digital capitalism which include a decreased workforce and the replacement of traditional production processes to more precarious forms of labour. In all, capital and labour are now based on information and services. It is important to understand, however, that digital capitalism extends beyond information industries and is purported to exist across every sector of the economy (Schiller and Yeo, 2017). Digital capitalism represents a new configuration of production, labour, and consumption across all sectors, including education. Schiller provides insight on the impact of ICTs in education by dedicating a chapter of *Digital Capitalism* where he explains how the private sector has influenced the start of the restructuring of educational institutions in the US through informational technology provisions (Schiller, 1999).

The literature on digital capitalism and education is strikingly limited. While many scholars engage with the themes and consequences of digital capitalism, very few use the theory directly in the context of education. Dan Schiller provides the most clear outline of digital capitalism in education. He does this by highlighting the major trends in education that result from or are affected by digital capitalism. These trends include: increased privatisation and commodification; blurring of public and private spaces with increased private sector involvement through new partnerships; and increasing vocationalisation of curriculum. To be sure, education was undergoing change before ICTs were integrated in

schools. However, digital capitalism has worked to accelerate and exacerbate these changes in fundamental ways.

The core argument of digital capitalism's effect on education beyond its aid in the proliferation of technology sector involvement in public education is the reorientation towards a market driven curriculum designed to cater to private sector partners. Schiller asserts: "Where once had existed relatively autonomous instructional and learning processes, increasingly, there were now attempts to cater more directly to labor markets" (Schiller, 1999, p. 144). With this has come an ideological shift toward valuing education for the sake of its value on the labor market. Schiller (1999) foretells that digital capitalism will deepen and IT industry involvement in education will broaden. It has been nearly two decades since *Digital Capitalism* was published and the existence of these trends today are apparent.

Information technology companies have seized the commercial potential in education. This is important because private interest is potentially shaping the public good—without input from the public. Moreover, private interests and ideas of public good are often at odds with public interest ideas. In sum, this warrants close attention because the values of capitalism do not typically reflect those of the public good. Understanding the commercial potential of education, it is unsurprising that technology companies have sought to entrench themselves in public education. Herman and McChesney (1997) demonstrate this rationale by saying

> In times of technological upheaval where nobody has a clear idea of exactly where things are heading, the smart course for a firm is to hedge its bets by getting involved in several options so it can be prepared to pounce on any one of them that shows commercial potential (p. 108).

While the commercial potential is indeed significant, what this study will show is how there is much more to gain in terms of influence for technology companies in education. It is important to understand the implications of this and the role that digital capitalism plays.

Ultimately, the use of the theory in the context of P-TECH helps to explain the interrelationship between the private sector, state, and civil society by detailing how

increased IT industry involvement in education has been enabled by political economic forces resulting in the sweeping privatisation, commodification, and vocationalisation of education. A prominent concern outlined in the literature on the corporate reform movement in education is that increased corporate involvement in education is creating a market-oriented education structure that threatens the fundamental socially oriented values of education. Taub and Schiller (2001) encapsulates this when they state,

> The ascending model of educational provision is replacing liberal arts education for all social classes with vocational skills, training, and values developed to prepare select students for careers in the production and sales systems of TNCs (p. 181).

Digital capitalism works to accelerate these trends. Overall, digital capitalism helps develop an understanding of the structural, political-economic forces driving the further entrenchment of the technology sector in education. It helps to unveil the broader implications of IT-industry led initiatives such as P-TECH and its social consequences.

Digital information over data networks is growing increasingly more central for economic and social activity. Digital capitalism suggests the ICT sector will continue to dominate the capitalist economy. The Internet serves as the backbone of services in the network economy making it fundamental to the functioning of the economy and a necessity for individuals to compete in the labour market.

2.4 Cultural studies

While cultural studies and the PEC are distinct and have historically been treated separately, it is important to note how Adorno and Horkheimer, cultural scholars from the Frankfurt School, played an influential role in the early development of the PEC. Indeed, Kellner (2006) explains

> The Frankfurt school inaugurated critical communications studies in the 1930s and combined political economy of the media, cultural analysis of texts, and audience reception studies of the social and ideological effects of mass culture and communications. The critical theorists analyzed all mass cultural artifacts within the context of industrial production in which the commodities of the culture industries exhibited the same features as other products of mass production: commodification, standardization, and massification. (p. 2)

As such, culture has always played a prominent role in political economy and this has only been exacerbated through new media (Kellner, 2006).

Adopting a Marxian approach to understanding culture and society, cultural studies focuses on the interplay of representation and ideologies of gender, class, ethnicity and race in cultural practices and texts (Kellner, 2001). Cultural studies is interested in the ways in which 'culture' influences individual experiences and everyday life through the examination of social relations and power, emphasising social agency and resistance to hegemonic forces.

Cultural studies scholarship examining technology and inequality in the realm of education has generally focused on media literacy and the differences in social contexts of computer use between different groups based on class, gender, race and ethnicity (Livingstone, 2004; Buckingham, 2009; Ito et al., 2010).

Theoretically, both the PEC and cultural studies derive from Marxian approaches. Where the two diverge is in their conceptions and concerns of power and levels of analysis. Power from a cultural studies perspective is rooted in individual identities and subjectivities (Fenton, 2007, p. 8). Cultural studies is interested in how culture influences individual experiences and everyday life by looking at social relations and power. In contrast to the PEC, which is not concerned with the micro-level, cultural studies emphasises social agency and resistance to hegemonic forces and examine the interplay of representation and ideologies of gender, class, ethnicity and race in cultural practices (Kellner, 2001). This emphasis on agency is referenced through active audiences, meaning consumers do not passively consume and accept mediated value-laden messages seen to promote hegemonic ideologies as an attempt to influence public consciousness (Radway, 1984; Liebes and Katz, 1994; Morely, 1993, Chen and Morley, 2006).

Cultural studies is critiqued for ignoring larger power structures constraining social agency and not acknowledging broader forms of oppression (Grossberg, 1996; Kellner, 2001). This stands in contrast to one major criticism levelled at the political economy of

communication which is that it does not acknowledge individual agency. By utilising both approaches, this study is able to provide a more nuanced analysis and highlight the affordances and constraints which can then be used to help inform policymaking decisions. These fundamental differences between the PEC and cultural studies are seen as antagonistic but I argue and demonstrate through the analysis how these are actually complementary approaches particularly for questions pertaining to digital inequalities and the interrelationship between the state, industry, and civil society. Both perspectives are also needed to answer the study's second research question which examines the distribution of benefits across P-TECH's stakeholders. The PEC is needed to understand what the consequences of the model are at the macro-level and the cultural studies is important for unveiling what is occurring at the micro-level. The second research question uses both to understand how the two are co-constitutive.

2.4.1 Theory of social reproduction and key concepts

Bourdieu sees reality as essentially social, where what is real is relational and dependent on whom one is surrounded by. What follows is a brief overview of Bourdieu's social reproduction thesis followed by his central concepts that are applied in this thesis: field, habitus, and capital.

Bourdieu's social reproduction thesis (Bourdieu and Passeron, 1977) examined the relation between education, family, and social class. The key argument put forth was that education plays a dominant role in the reproduction of social inequality. The theory of social reproduction offers a paradigm of class analysis that is used to explain persistent inequalities in terms of educational stratification. While inequalities in cultural capital reflect inequalities in social class, Bourdieu contends that the mechanism through which these inequalities become reproduced is through schools. His central argument is that schools reproduce existing inequalities through their structure and curriculum that implicitly promotes the cultural capital of the dominant class. Students exposed to elite culture outside of school are

in privileged positions in school. Students who possess cultural capital are rewarded while others are penalised. This possession of cultural capital is perceived to be meritocratic and signifying skills rather than the result of cultural conditioning. Importantly, Bourdieu (1977) argues that the dominant culture is actually arbitrary. Bourdieu believed teachers would misrecognise elite culture competences for academic performance (Bourdieu, 1977, p. 32). This works to exclude students who are not part of this dominant culture, further marginalising them. If one does not belong to the dominant culture or is not familiar with it they have less opportunities for social mobility.

The theory of social reproduction is seen as offering an explanation for persistent inequalities based on cultural class analysis. For Bourdieu, the dominant culture is imposed and reproduced through educational systems (Bourdieu and Passeron, 1990). He argues that schools are based on elitist values, which excludes from the elite at a serious disadvantage with fewer opportunities to succeed. Cultural capital is an individual's knowledge, experience, and connections and is intrinsically linked, along with economic capital, to education. Class (economic capital) and knowledge, experience, and connections (cultural capital) directly influence the reproduction of class through education. The possession of the dominant culture is known as cultural capital and it is unevenly distributed throughout the class structure. Several studies have applied Bourdieu's theory of cultural reproduction while focusing on the concept of capital, in order to understand education and digital inequalities (Huysman and Wulf, 2004; van Dijk, 2006; Hargittai & Hinnant, 2008; Ignatow and Robinson, 2017; Beckman, Apps, Bennett and Lockyer, 2018). These studies are centrally concerned with differentiated use and integration of ICTs concluding that the contours of digital exclusion are reflective of wider divides in social resources (van Dijk, 2006). Broader conceptions of digital inequalities also include the positional suffering of traditionally marginalized groups influencing a range of social variables such as beliefs, values, self-efficacy, and behaviours, which can be further assessed through Bourdieu's concept of

habitus (Bourdieu, 1990). These are important aspects of inequality not captured by the binary inclusion/exclusion logic of the network society. As such, this serves as a meaningful example of how the PEC and cultural studies are used as complementary approaches in this study.

2.4.2 Bourdieu's key concepts: Field, habitus, and capital

Bourdieu used his concept of field to encapsulate the distinct arenas of practice such as education, religion, and law that he believes the social world to be divided by (Bourdieu, 1993). Fields denote arenas of production, circulation, and exchange of goods, services, status and knowledge. Each field entails its own set of rules, practices, positions, and forms of capital and is a site of struggle for those who are a part of it. Actors within fields compete to accumulate and monopolise different types of resources, which Bourdieu calls capital. Fields are organised by these different types of capital which are unequally distributed with actors struggling over them. The struggles come from people seeking positions to increase their claim in the field. Fields are perceived to be distinct from one another and autonomous. However, this is not to say that fields do not overlap. As chapter 7 will demonstrate, religion and education overlap in fundamental and interesting ways, which has a profound impact on institutional culture. In all, the concept of field is used as a theoretical tool that captures both macro-level and micro-level structures. Indeed, Bourdieu (1997a, 2004) has applied the concept of field to reference broad economic fields such as the state as well as individual firms such as banks. P-TECH would be recognised here as a social sub-field within the social field of secondary education. Schools as sub-fields are arenas where secondary education is played out by its actors within including principals, teachers, staff, and students.

Habitus is a conceptually ambiguous and complicated construct. Bourdieu defines habitus as "A structuring structure, which organises practices and the perception of practices" (Bourdieu, 1986, p. 170). It refers to the physical embodiment of cultural capital consisting of people's thoughts, beliefs, interests, preferences, and understanding of the world (Bourdieu,

1986). It is a form of cultural inheritance that reflects a person's class or position within a field (Bourdieu and Passeron, 1977, pp. 204-205). The components of cultural capital that make up habitus are the product of socialisation primarily through family. Put another way, habitus can be understood as the internal representations of external social structures. Habitus is intricately linked with social structures within a specific field and influences how people navigate their social environments. Overall, individuals share particular dispositions, values, and beliefs rooted in their social locations with others belonging to the same social groups or classes. However, each individual's habitus is distinct because no one person shares the exact same personal history with someone else.

Habitus also applies to one's "taste" for cultural objects such as art and clothing (Bourdieu, 1979). The notion of tastes is discussed in Bourdieu's book *Distinction* and he associates different tastes with social class. He argues that social classes typically share common dispositions, views, preferences and practices (Bourdieu, 1986). In this book, he argues that aesthetic senses come from culturally ingrained habitus and uses access to "high-art" as an example to support this. He explains that those from upper-class backgrounds have been exposed and conditioned to appreciate fine art from an early age. He goes on to say that those from working-class backgrounds generally do not care for "high art" and as such, have not cultivated the habitus that aligns with a taste for it. Possession of "highbrow" culture is unequally distributed but bestows 'distinction' and privilege upon those who possess it. The key point to understand from habitus is that these tastes are often mistaken as natural instead of culturally developed. At an individual level, habitus needs to be understood as an expressed matrix of dispositions that are internalised over time through the process of socialisation which informs how people participate and navigate fields (Bourdieu and Wacquant, 1992).

A central point made about habitus is that bounds a person's thought and action but does not determine it. This is particularly important for this study as it helps to answer the third

research question regarding P-TECH's influence on students' identities and aspirations. This becomes relevant when the concept of habitus is extended to institutions.

Some scholars have extended the concept of habitus by applying it to educational institutions (McDonough, 1997; Reay 1998; Reay et al. 2001). Studies have applied institutional habitus in their work examine how the embedded values within institutional designs might influence actor behaviors, beliefs, and values (Raey, 2004; Raey and Ball, 2005; Morrison, 2007; Smyth and Banks, 2012; Byrom and Lightfoot, 2012). As schools are considered to be social fields, they inculcate their members with their own collective habitus (Hughes and Blaxter, 2007). Reay et al. (2001) argue that institutional habitus entails "…the impact of a cultural group or social class on an individual's behaviour as it is mediated through an organisation" (p.2). They also argue that institutions act as "an intervening variable, providing a 'semi-autonomous' means by which class, raced and gendered processes are played out in the lives of students" (Reay et al, 2001, p. 2). The core argument being made throughout these studies regarding institutional habitus and education is that, in the same way an individual habitus acts as a structuring principle, the practices within a school informs a students' actions and beliefs in a way that aligns with the institutional values. This is particularly useful for answering the study's question pertaining to P-TECH's influence on students' identities and aspirations.

In trying to understand the ways in which institutions influence individual beliefs, values, and practices, it is first important to understand an institution's culture. Institutions encompass their own unique cultures and these cultures are embodied by its members and expressed through everyday practices and norms at the school. An important note to make for this study is that teachers can also mediate the culture of the school for their students which represents the agency component within institutional habitus. Chapter 6 will highlight exactly how this happens through the study's data.

Bourdieu believed that capital forms the foundations of social life and shapes an individual's social position within the social order. The more capital someone has, the more powerful position they occupy. While there are numerous forms of capital utilised by Bourdieu throughout his work this study focuses on the role and dynamics of three: economic, social, and cultural capital.

Economic capital is understood the same as Marx's idea of capital in its most basic sense, the accumulation of material assets and resources that can be directly converted into money. Bourdieu extended this understanding of capital into the cultural realm and put forth the concept of cultural capital. In "Cultural Reproduction and Social Reproduction" (1977) Bourdieu and Passeron state that cultural capital refers to the accumulation of symbolic social assets of a person such as tastes, mannerisms, clothing, academic credentials, and material belongings as status symbols. Cultural capital is comprised of cultural codes and practices that are transmitted by parents. Bourdieu states that cultural capital exists in three forms—embodied, objectified, and institutionalised (1986). Embodied cultural capital comprises the knowledge required and inherited through socialisation. Again, cultural capital is accrued over time through a person's habitus (way of thinking), which makes someone receptive to cultural influences. Objectified cultural capital is comprised of a person's property that symbolically conveys the social position and possession of cultural capital had by owning them. Institutionalised cultural capital includes a formal recognition of someone's cultural capital by an institution. The most common examples are professional qualifications and academic credentials.

The last form of capital that is relevant for this study is social capital. Social capital is defined as "the aggregate of the actual or potential resources which are linked to possession of a durable network […] or in other words, to membership in a group" (Bourdieu, 1997, p. 51). In contrast to cultural capital, social capital is a shared and distributed property and is given value based on the position of an individual in the social network they belong to. One's

social capital is determined by their position in a network based on their ability to "effectively mobilize [the social capital] and on the volume of the capital (economic, cultural, or symbolic) possessed" throughout the network (Bourdieu, 1997, p. 51). All of these concepts, capital, habitus, and field shape an individual's identity.

2.4.3 Identity

Identity is a particularly complex concept that is variously understood as a self-image. It is a social process where the individual and the social are intricately connected through a reciprocal relationship between the two. Individuals influence the organisation of society through shared actions that constitute the creation of groups, networks, and institutions (Stryker, 1987; Hecht, 1993). Society, in turn, influences identities through the provision of shared language and tools for people to make sense of their 'social memberships'. This thesis adopts the understanding that identity is dynamic and process-oriented (Horowitz, 1975; Hall, 1992; Kellner, 2003; Gauntlett, 2002). More specifically, identity is conceptualised here as a set of traits and characteristics, social group memberships, social relations and roles defining who one is and informing their sense of belonging. Moreover, identities are "...formed and transformed continuously in relation to the ways we are represented or addressed in the cultural systems which surround us" (Hall, 1992a, p. 277). Identities are complex constructions with different axes of identity including gender, age, class, culture, and ethnic affiliation (Gauntlett, 2002). In all, identities are fluid, relational, and something that is accomplished and negotiated through ongoing social interactions.

The understanding of identity put forth in this thesis derives from social identity theory which posits that identities are constructed by social roles and social categories including class, race, ethnicity, and gender (Hecht et al., 1993). Social categories or roles inform one's sense of belonging and become internalised by those who associate their social group membership(s) with their identity (Stryker and Burke, 2000). The internalisation and negotiation of ascribed identities by others are key crucial aspects of identity creation. While

research on identity construction understands identity as relational and process-oriented, there has been limited engagement with the ways in which identity is communicated (Hecht et al., 1993). The underlying thesis of how identity is understood here is that it is experienced through communicative practices in terms of enactments or the ways in which identity is expressed. Ultimately, identity is something that is formed, modified, and maintained through communicative processes (Hecht et al., 2005). Closely related to this understanding, and utilised in this study, is Erving Goffman's (1959) dramaturgical model from *The Presentation of the Self in Everyday Life.*

2.4.3.1 Dramaturgy and Stigma

A particularly important aspect of identity for this study is how it also encompasses the person one aspires to become or feels obligated to try to become (Mead, 1934). This points to the performativity involved in identities from which this thesis relies on in answering the study's third research question pertaining to P-TECH's influence on students' identities and aspirations. Through his "dramaturgical approach" (1959) Goffman provides a microsociological analysis focusing on the mode of one's presentation of self and its meaning in the broader social context (p. 240). Goffman's dramaturgical model and the concept of stigma are applied to the data in order to answer this study's third research question. Indeed, Goffman's dramaturgical model and concept of stigma are particularly well-suited for this study. *Dramaturgy* is a theoretical framework used to examine individual identity, the impact of environmental contexts on social interaction, and group relations conceptualised in terms of theatrical performances. In addition to the characteristics of identity outlined above, Goffman posits that identity is something that is performed.

Goffman's dramaturgical model is broken down into 'front stage' and 'back stage' behaviour. Front stage is "that part of the individual's performance which regularly functions in a general and fixed fashion to define the situation for those who observe the performance" (Goffman, 1959, p. 22). Front stage behaviour/performance provides the basis for others to

understand one's character traits and position them through society's shared meaning and categories. Individuals seek to create impressions on others in order to achieve specific goals, which Goffman identifies as 'impression management'. Impressions are created through what Goffman calls "sign vehicles" which are used to present oneself to others. The purpose of sign vehicles is encapsulated in the following excerpt:

> Information about the individual helps to define the situation, enabling others to know in advance what he will expect of them and what they may expect of him… For those present, many sources of information become accessible and many carriers (or 'sign-vehicles') become available for conveying this information (Goffman, 1959, p. 13).

Some common sign vehicles utilised include: social settings, appearance, and manner of interacting. As part of this impression management process, an individual may tailor their appearance and mannerisms toward the social role they seek to be associated with. Appearance is what determines how first impressions are crafted. This includes clothing, posture, race, ethnicity, and physical characteristics aligning with stereotypes. In order to maintain the desired impression, presentations of the self must be habitual. Indeed, the front is where a person fulfils the duties of the social role they are assuming and communicate the characteristics of the role to others. In sum, presentations of the self are marked by posturing that is deliberate and identity is a construct that must be maintained. Moreover, performances of the self are fundamentally shaped by social norms.

Back stage is considered to be private space where individuals do not have to perform. For back stage behaviour, people do not need to negotiate between the impressions created through front-stage interactions. This can also be said to run counter to the notion and impact of stigmatised individuals internalising stereotypes associated with their social categories or roles.

Stigma is an important concept for this study in assessing P-TECH's influence on identity. It is a construct that has significant effects on marginalised groups in particular. A stigma "refers to an attribute that is deeply discrediting" (Goffman, 1963, p. 3). A person's stigma "makes him different from others in the category of persons available for him to be, and of a

less desirable kind" (Goffman 1963, 3). Stigmatisation occurs when an attribute is connected with negative stereotypes (Jones et al., 1984). Stigmas are mostly associated with group memberships such as race, gender, and ethnicity and stereotypes are often associated with these social categories. Importantly, stigma can have a significant influence over identity as it affects how the person or group of people being stigmatised is viewed. Furthermore, stereotypes are often internalised by stigmatised individuals which can influence how these individuals communicate their identity (Jung and Hecht, 2004).

Questions of identity are inevitably tied to issues of social status and class. Stigmatised individuals are further disenfranchised through structural discrimination based on broader institutional practices. Stigma and class are inextricably linked in the context of P-TECH. As an example, many P-TECH students are coming from lower income households and often lack the cultural and social capital (Bourdieu, 1986) needed to be considered for many positions in the technology sector or other professional settings. As such, lower income individuals remain excluded from valuable social networks and have limited opportunities for social mobility. As P-TECH seeks to equip students with the knowledge regarding how to behave in professional spaces and connect them to employers in the technology sector, the perpetuation of hegemonic norms expressed as idealised performance illuminate the more serious consequences of stigma.

Overall, marginalised individuals face the most obvious challenges and pressure to adhere to idealised conduct in order to be perceived as credible actors in certain contexts and spaces. The associated stigmas of some groups are perceived as 'discreditable' due to their deviance stemming from the nature of their stigma (Goffman, 1963, p. 42). As an attempt to resist stigmatisation and be perceived according to one's desired goals individuals work to conceal undesirable aspects of one's self. Parallels can be drawn here to Anthony Giddens' (1991) 'project of the self' where individuals are constantly policing themselves according to specific goals and social norms.

Goffman's contributions from dramaturgy are used to make sense of the ways in which P-TECH is influencing identity and aspirations. The concept of stigma supports how P-TECH students are influenced and constrained by hegemonic norms and their need to negotiate conflicting aspects of their identities. It is through hegemony as it relates to Goffman's notion of stigma that connections are able to be drawn between macro- and micro-level implications of the P-TECH model in the context of identity. These identity-related concepts are intricately bound up with the corporatisation of education and its consequences. In order to understand this connection further, it is important to first understand what has led to the current corporate reform of education.

2.5 Corporate reform of education

One defining feature of former President George W. Bush's legacy is his Elementary and Secondary Education Act, more commonly known as No Child Left Behind (NCLB), which helped usher in a new era of education reform once it was passed by congress in 2001. This new era of education reform is characterised by hyper- accountability measurements, high-stakes testing, deregulation, choice, charter schools, privatisation, and data-driven decision making (Ravitch, 2010, p. 21). Under NCLB, schools that did not perform adequately in equipping students with proficient skills in math and English faced detrimental sanctions. This led to mass teacher layoffs throughout the country and subsequently deepened the divide between teachers' unions and corporate reform advocates.

No Child Left Behind provided pathways to further the marketisation and privatisation of education which are key components of the corporate reform movement. Corporate reform of education positions market competition and business management as the key to improving education (Apple, 2006; Ball, 2012). As such, the corporate reform movement seeks to overhaul education through corporate model of privatisation and market competition (Bowles and Gintis, 2011; Ravitch, 2013; Hursh, 2015, 2017). The logic underpinning the corporate reform agenda is that the quality of public education will improve if schools operate as free

market entities that are forced to compete for students. This corporatisation of education has resulted in an increasingly privatised education system through the expansion of publicly funded but privately administered charter schools. Additionally, curriculum and tests are being crafted by supplementary education service companies. In the case of P-TECH, the curriculum is shaped by corporate partners and based on industry needs. The corporate reform movement is shifting where education policy is made and who makes them. This shift is one away from local and public levels that include community and teacher voices toward private and less transparent spaces occupying corporations, nongovernmental organisations, and wealthy philanthropists (Callahan, 2017; Hursh, 2017).

Investments in education take on even more widespread and heightened value in the network society. As previously established above, this is because those who are not being equipped with the 21st century and digital skills needed to compete in the labour market and participate fully in today's society will be effectively excluded and further marginalised. A series of educational technology policies and initiatives have erupted in response to this pressure and concern.

The first widespread educational technology policy initiative can be traced back to the Clinton and Gore administration with the High Performance Computing Act of 1991 that aimed to increase access to information through the internet in both public and private sectors (Wiggins, 2000). From that came the 'US National Information Infrastructure' (NII) initiative which sought to connect everyone, including schools, to what was referred to as the 'information superhighway' (Selwyn, 2013). In 1998 the Clinton administration introduced the E-Rate program that uses funds from the Universal Service Fund to assist schools in obtaining affordable network connections (Gilroy, 2003). With the goal of promoting competitiveness and preparing students for jobs in the new millennium, George Bush and his administration proposed a series of measures called Jobs for the 21st Century with a central focus on improving STEM education in high schools (Department of Education, 2004). In his

State of the Union address, George Bush encouraged schools to invite math and science professionals from the private sector to teach part-time in high schools (State of the Union Address, 2004). With the purpose of increasing the place of the US in terms of global competitiveness, Barack Obama implemented several STEM initiatives including ConnectED and Educate to Innovate, which provided billions for STEM programs across the country (Burke and McNeill, 2011). Ultimately, this pressure to equip students with these skills alongside the championing of corporate reform has produced a climate ripe for technology corporation intervention.

2.5.1 Education and techno-venture philanthropy

Corporate philanthropy is one of the primary ways in which the private sector enters the education market (Saltman, 2010; van Fleet, 2012). The available studies on public-private-partnerships in education demonstrate that corporate philanthropy almost always includes additional self-interested motivations in the form of profit-generation (Edwards 2008; Giroux 2011; van Fleet 2011; Picciano and Spring, 2013; Callahan, 2017). Corporate venture philanthropy is often pitched by companies as a form of corporate social responsibility (CSR) and volunteerism. Highlighting the influence and potential ability of philanthropy to reconfigure longstanding power relations throughout society is Michael Bloomberg's (2015) statement regarding his philanthropic strategies writing: "Some still see philanthropy as an alternative to government. I see it as a way to embolden government" (Bloomberg, 2015, p. 3). Notably, Michael Bloomberg is a media mogul, a billionaire philanthropist, and the former mayor of New York City which is important in the context of P-TECH and will be discussed in Chapter 5.

Global technology companies have taken considerable interest in education particularly over the past six years. While the corporatisation of education has been underway for a couple of decades now, a distinctive approach has emerged from Silicon Valley techno-venture philanthropists. Corporate philanthropists have an extensive history in education but

the rise of technology companies launching their own initiatives in public education did not proliferate until the late 1990s. This techno-venture-philanthropy has grown considerably over the last six years and now dominates the education reform scene today. This dominance and characteristics of what has been called 'West Coast philanthropy' (Callahan, 2017, p. 14) is the inspiration behind my concept technocratic corporate reform used to characterise the technology industry-led overhaul of public education. The main corporate technology actors in education philanthropy are Bill Gates through Microsoft's Bill and Melinda Gates Foundation, Bill Hewlett and David Packard through the Hewlett-Packard Foundation, John Morgridge from Cisco, Irwin Jacobs of Qualcomm, PayPal's Peter Thiel, and Facebook's Mark Zuckerberg.

The conflicting worldviews and values between Silicon Valley and public education have brought about significant challenges and repercussions that warrant attention. First, a central characteristic of West Coast philanthropy includes technology philanthropists' aim to create change on a grand scale. As this thesis will show, rather than just wanting to impact one or a few schools in underserved areas, IBM created P-TECH to be a scalable model with the intention of overhauling the entire US public education system. The risk of this is missing important contextual factors and local needs of schools and students that might render the initiatives non-conducive and ineffective. Silicon Valley ethos applied to education have much greater risks than those embedded in start-ups. Indeed, technology sector culture celebrates taking large risks until one successful outcome occurs and takes off. However, what is at stake in education are the life prospects of students. Because many initiatives including P-TECH initially start by serving low-income marginalised students, the risks are even higher as failed initiatives may work to subject them to further marginalisation.

There is often a significant amount of enthusiasm surrounding these initiatives based on perceived affordances of ICTs. However, a prominent critique of IT led education initiatives is that they are not sustainable (Unwin, 2009). Many popular technology sector led initiatives

lose the commitment of resources and are terminated prematurely. This is partly the result of one-size-fits-all policies and planning with lack of thought dedicated to local contexts and particular needs of the intended beneficiaries.

When the Bill and Melinda Gates Foundation abandoned their small school initiative, districts were left with costlier to run small schools forcing many to be shut down. This left many parents being forced to move and other students dropped out completely (Saltman, 2010). The skills and process entailed in the creation of software are vastly different than what is required for significant social change. Acute awareness of social complexities and deep understandings of factors and processes behind inequality should be considered prerequisite knowledge for anyone pursuing such grandiose missions to improve social institutions.

The literature surrounding education and technology is dominated by a focus on the technical, pedagogical, and learning aspects of technology and education. This literature remains largely disengaged from social, political, and economic conditions in which they interact particularly in those promoting the learning and pedagogic potential of technology use in education. Perhaps the most meaningful contributions toward scholarship that directly engages with the broader social forces of technology use have been made in by political economy of education and technology scholars throughout communication and new media studies. Some of the most influential scholars that examine technology and education in the context of wider issues of politics, economy, and society include: Neil Postman, Larry Cuban, Neil Selwyn, Michael Apple, and Joel Spring.

The logic underpinning the technocratic corporate reform movement detailed throughout this thesis is that technical and corporate solutions are key to improving the quality and outcomes of the public education system. Despite the lack of evidence to support this claim, the promotion of the need for digital and 21st century skills alongside the position of technology and the technology industry in society has aided in the widespread acceptance of

this logic. In their book The Great American Education-Industrial Complex, Picciano and Spring (2013) offer a detailed analysis of US technology-centred education reform by mapping "the networks that link education business to government policies and the public purse" (ix). Their central argument, which aligns with one put forth in this thesis, is that digital technology serves as a means for technology industry actors to entrench themselves in the public education market in order to advance their own interests. Indeed, this study exposes the networks and alliances that have enabled IBM to accomplish this through their P-TECH model. As techno-venture-philanthropists continue to pursue ambitious projects and partner with the government, the technology industry and private actors will grow deeply enmeshed in the shape of civic life.

Neil Postman makes an astute observation in his (1992) book, Technopoly: The Surrender of Culture to Technology when he claims, "What is clear is that, to date, computer technology has served to strengthen technopoly's hold, to make people believe that technological innovation is synonymous with human progress" (p. 117). This quote highlights how the fetishising of technology in society works to obscure the systemic issues responsible for the perpetuation of existing inequalities. Indeed, this faith in technology and the perception of technology as being a great equaliser has funneled valuable resources and investments toward technical solutions to sociocultural problems. As long as this sort of techno-optimism continues to pervade policy discourse and related ICT initiatives, there will be no alleviation of existing inequalities and as such, render many ICT driven education initiatives ineffective.

After presenting the examination of a number of bodies of literature, it is clear that there is a need for more socially grounded approach with heightened political awareness to research into the role of the IT industry actors in education. Chapter 3 follows this with the rationale behind this study's research design and how the combination of its unique theoretical framework with the methodological approach works to support these aims.

Chapter 3 Research Design and Methodology

This study's research design derives from the constructivist paradigm and utilises naturalistic inquiry. Naturalistic inquiry came out of constructivism and posits that reality is a subjective creation or socially constructed and is primarily concerned with understanding social life through context-specific social processes (Berger & Luckmann, 1967; Vygotsky, 1978; Lincoln & Guba, 1989; Neuman, 2000). Reality here, then, is understood to be socially constructed based on one's interaction with society and culture (Patton, 2002). Therefore, underpinning naturalistic inquiry is an understanding that the world and reality cannot be considered in isolation from their context (Lincoln & Guba, 1985; Patton, 2002; Creswell, 2014). Naturalistic inquiry is relevant and valuable for exploring P-TECH in the current context of US K-12 public education because it provides a level of contextual relevance and richness that is unmatched by other paradigms (Guba & Lincoln, 1985, p.235). Informed by the tenants of naturalistic inquiry, this research constitutes a mixed methods collective embedded case study of the P-TECH network.

The primary case study and qualitative methodological principles informing this research include: its constructivist assumptions about the nature of knowledge, the centrality of culture with an interest in cultural policy and cultural politics, reflexivity, and the utilization of a range of techniques to understand the complexities embedded within a given phenomenon and those experiencing it (Willis & Trondman, 2002). This study is ultimately driven by the utilisation of a range of methodological techniques employed to identify cultural currents and assumptions associated with P-TECH through an examination of the embedded beliefs, practices, and interactions observed. An embedded case study is most suitable for achieving this which is explained further below.

3.1 An embedded case study

I have chosen to utilise a collective embedded case study research design for this study. Embedded case studies include more than one object of analysis and are most appropriate for

mixed-methods research (Scholz & Tietje, 2002). P-TECH is the case and the schools examined are the embedded cases. Collective case studies entail a grouping of instrumental cases in order to advance understanding of a particular phenomenon being studied (Stake, 2000). Moreover, collective case studies are known for enabling more consistent and stronger interpretation and theorizing (Stake, 2000). An embedded case study is most suitable because this study includes three individual but related cases and utilises both quantitative and qualitative methods. The individual cases are referred to as sites rather than cases in order to ensure clarity by providing a clear distinction between these and the overall P-TECH model as the case study.

Case studies are understood as an empirical inquiry into a contemporary phenomenon within its real-life context and in which multiple sources of evidence are used (Yin, 1984, p. 23). Aligning with naturalistic inquiry's core belief that phenomena should be studied in situ and cannot be divorced from their context, case studies allow for detailed contextual analyses. Indeed, one significant benefit of case study research is the ability to provide comprehensive in-depth understandings of contemporary phenomena due to its capability to handle diverse and large amounts of data (Stake, 2006; Flyvbjerg, 2006 Merriam, 2009; Harrison, Birks, Franklin and Mills, 2017). A common misconception of case study research designs is their inability to support generalisability (Yin, 2003; Flyvbjerg, 2006; Merriam, 2009). This criticism has been challenged by multiple scholars, arguing that case studies are not meant to be generalisable to a broader population but do provide details of a theoretical construct (Yin, 2003) and serve as a valuable source of necessary context-dependent knowledge (Flyvbjerg, 2006).

Ultimately, a collective embedded case study is most suitable for this study because it looks at both micro and macro-level influences of the P-TECH model and encompasses both qualitative and quantitative methods. The advantage of embedded case studies is that they

result in more robust analytical conclusions than single site case studies (Scholz & Tietje, 2002; Yin, 2003).

This embedded case study is made up of three P-TECH schools in different states and regions of the US. The broad aims of this study are to critically examine the private sector's increased role in technology-driven education models within the US public education system through their promotion of technology's perceived affordances, particularly in relation to digital inequalities. This makes P-TECH a particularly appropriate site of analysis as the aim guiding this study directly aligns with the central aim of P-TECH's mission to equip traditionally marginalised students with 21st century skills while simultaneously providing a specifically trained and skilled employee pipeline for their industry partners. Ultimately, P-TECH was chosen because it sits at the intersection of private sector involvement in public education, technology, and inequalities. Given this, an embedded case study of P-TECH enables a rich analysis answering the study's research questions through an integration of both the political economy of communication and cultural studies.

The most common way of entrance for technology companies in public education is through ICT initiatives based on the purported promises of technology to close achievement gaps. This was the approach for IBM with their P-TECH model promoting the goal as providing traditionally underserved youth with technology resources and career opportunities that they would not otherwise have. In seeking to understand the consequences of increased technology sector influence in public education at both structural and micro-levels, the P-TECH model, with its rapid expansion, presents itself as an appropriate site of analysis.

A central claim underpinning the P-TECH model is that it will enable students from primarily low-income households to achieve upward mobility through exposure and connections to ICTs. Indeed, in his 2013 State of the Union Address, President Obama touted the model as "a ticket to the middle class" (State of the Union Address, 2013). It is also the most appropriate site when seeking to understand the relations of power in which the model

is situated. Characterised as a public private partnership, the model gives a direct view into the interrelationship between the state, industry, and civil society. The role and distribution of authority throughout the P-TECH model is demonstrative of how similar models and education policy are being informed. In terms of the second research question pertaining to the consequences of the P-TECH model through an assessment of the benefits and costs of the model, if the goal is to expand the P-TECH model until it becomes a normalised secondary public education model across the country with its unique combination of STEM and career focus in partnership with the private sector, then it is particularly important to understand its potential ideological influences on both the students and the education system.

Another reason for choosing P-TECH is its scale. Within its first five years, the P-TECH model has expanded to sixty schools across the US and Australia and has over three- hundred business partners. Again, the size of the model is important when seeking to understand the potential governance and organisational influence at a systemic level. The size of the network combined with the alignment of its aims with this study's research questions informed the third key reason for choosing P-TECH as the site of analysis.

While there are many new models and initiatives proposed and implemented every year across the country, few have received the level of praise and publicity as P-TECH and none have experienced the same level of reach. Politicians, including President Obama and former secretary of education Arne Duncan both touted the P-TECH model as the future of American K-12 education. I found this curious when the model has yet to produce its first full graduating class and wondered what set this model apart from the numerous other new school models that are proposed and implemented each year but most often found to be unsustainable or unremarkable. The next chapter begins to illuminate what is responsible for this early praise of the model. Given these motivations and the current socio-political context, the P-TECH network ultimately presents itself as a particularly suitable and interesting case for examining the political, economic, social and cultural elements of the model while

exposing the role of power embedded in its structure and the interrelationship between politics and industry.

3.2 Selection of Sites

When selecting the sites, I repeatedly referred back to the purpose of the study in order to ensure that the sites selected would satisfy its purpose and answer the research questions. According to Yin (1994), "Every case should serve a specific purpose within the overall scope of inquiry" (p. 45). The sampling procedures for these sites had the objective of having a sample with useful variation that will contribute to the dimensions of theoretical interest (Patton, 2002). Thus, the three sites were chosen based on "intensity sampling" (Patton, 2002; Suri, 2011; Palinkas, 2015). Intensity sampling uses similar logic as extreme sampling in that it involves selecting rich examples of the phenomenon being studied, but with intensity sampling these include sites that are not highly unusual or 'at the extreme' (Patton, 2002; Suri, 2011). As such, intensity sampling was used here in order to capture the boundaries of the P-TECH model. This purposive sampling method is useful in finding central themes that cut across various sites (Patton, 1990; Palinkas, 2015). Intensity sampling requires exploratory work from the researcher in order to determine what level and types of variation are most useful for capturing the core experiences and impacts of the given phenomenon (Patton, 1990). After becoming familiar with the variations of the model and wanting to capture its boundaries, I chose the three sites based on the following four criteria: model type, phase of development, job pathways, and geography.

While all P-TECH schools have the same overarching goals and encompass a six-year high school model, there are variations in their structure. The different variations include: the within-the-school model where there is a separate program within an existing high school that follows the model, a stand-alone P-TECH school where the entire school is following the P-TECH model, and the charter school model. The three sites that were selected represent

each. The first site was a within-school P-TECH model, the second was a stand-alone P-TECH school, and the final site was a P-TECH charter school.

The school's phase of development was another criterion used for choosing each case. In order to see how the model functioned at different stages of development, schools were chosen in varying years of operations, with one each in the first, second, and fourth year of operation. While I was not able to gain access to the original P-TECH school, which would have been in its fifth year at the time of field work, for political reasons which are described in-depth in chapter seven, I was able to interview people involved in the planning and development process for the original school. Valuable insight including all available post-graduation data for students that have graduated early was also gained from the interviews. Not being able to access the original school for observations was made up for with the other school in New York City that follows the same structure and had several people working there that came from the original P-TECH.

Job pathways was another criterion. The P-TECH model was originally designed with the primary aim of preparing traditionally marginalised students for middle skilled STEM jobs. While the aim and scope has shifted and grown since P-TECH's inception, the core objective is still to equip students with necessary twenty-first century skills in order to be competitive in today's labour market. One new focus is on developing the local economy where P-TECH schools are located. As such, the P-TECH model has moved beyond strictly focusing on information technology and now aims to incorporate STEM education and skills with what the local economies demand. Given the broad range of career foci the schools encompass (Appendix I), I chose sites with three different career foci which included one with the original IT focus, one focused on advertising and one on advanced manufacturing.

The final criterion I considered when selecting sites was geographical location. I chose schools that were in different states and regions of the country. The rationale behind this is based on the structure of American education. The US education system is decentralised

where power over education is given to the states and local authorities. Individual states are responsible for providing the main source of funding for their public schools, setting standards for examining and licensing educators, and setting curriculum and assessment standards (U.S. Department of Education, 2008). Selecting sites in different states and regions (the Northeast and Southwest regions) allowed me to gain a broad and well-rounded understanding of how the model operates and see how different state's regulations affect the sustainability and operation of the model. Ultimately, the high degree of variability among the sites enabled me to gain a deeper understanding of the boundaries of the P-TECH model while gaining rich context-specific data including the particular challenges and benefits that each face.

3.3 Methods and data sources

Methods were chosen that would best capture the organisation, governance, and experiences within the P-TECH model. The methods employed include semi-structured interviews, participant observation, and a social network analysis of the P-TECH network. A notable strength of case study research is its ability to handle multiple sources and techniques in the data gathering process. Yin (2003) outlines six sources that can be collected for case study research including, documents, archival records, interviews, direct-observations, participant-observation, and physical artefacts. Of these data sources, this study encompasses documents, interviews, and participant-observation. The study's core qualitative data sources include field notes and transcripts from 60 semi-structured interviews I conducted with educators, private partners, and students from each school. The social network analysis data came from the online P-TECH database that lists all partners and P-TECH schools in the network and individual actors included in the network were derived from media documents including press releases and news articles. Table 3.1 shows the study's methods with their corresponding data sources.

Table 3.1 Methods and data sources

Methods	Data Sources
Social Network Analysis	News articles, press releases, blog posts
In-depth Interviews	Interview transcripts
Participant Observation	Field notes, Analytic Memos
Document Analysis	News articles, press releases, blog posts

The remainder of this sub-section is structured by method utilised and its corresponding data source.

3.3.1 Social Network Analysis

I conducted a social network analysis facilitated by Gephi software in order to identify the key actors, highlight relationships, and create a visual of P-TECH's overall structure that is not readily apparent. The primary purpose of this method for this study was to answer the first and second research question by examining whose interests are being represented and served across the P-TECH network. It is also useful in explaining how the relations of control and influence among stakeholders align or challenge broader political economic power structures between the state, private sector, and civil society (Ball, 2008). Network thinking has made significant contributions to further understandings of relations of power across social structures. Underlying the network approach is the understanding that power is inherently relational (Hanneman & Riddle, 2005). Social network analysis is useful for understanding and visualising this in a systematic way. It allows for quantitative comparisons of actors' roles in a network which is valuable when seeking to understand the how balanced or imbalanced the relations of control and level of influence may be between actors in the network.

Social network analysis is particularly useful for understanding education systems because it shows individual actors' relative positions and influence within a network while deconstructing the institutional activities responsible for the overall organizational dynamics (Borgatti et al., 2013). In order to accomplish this, I created a spreadsheet that included every school, industry partner, and local college partners found through the online P-TECH

database. In order to capture the schools that were too new to be added to the database and find out who the key actors in the P-TECH network were I systematically collected all online P-TECH news articles and press releases published weekly from October 2014 through October 2017. I then tabulated how frequently each person was featured in an article, noting who they appeared with, then added them to the network. Once the network was imported into Gephi I ran different measures of centrality, which are discussed in the next chapter, based on what information was needed to answer the research questions.

Ultimately, social network analysis provides a way to answer questions involving relational data at a structural level. The social network analysis allowed for formal assessment of influence within the P-TECH network, helping to answer one of the study's guiding research questions. It also helped to explain how P-TECH has sustained its growth and public praise when most new models fail.

3.3.2 Participant observation

The purpose of participant observation for this study was to gain a rich understanding of the organisational, cultural, and ideological components of P-TECH. I spent one month at each school during the months of February 2016, March 2016, and October 2017. I attended each school five days a week observing classes, meetings, and any relevant extracurricular activities such as mentor meet-and-greets, field trips to the industry partner sites, and recruitment events. Participant observation as defined by Marshall and Rossman (1989) results in, "the systematic description of events, behaviors, and artifacts in the social setting chosen for study" (p.79). It involves active looking, informal interviewing, detailed field notes, and memos (Adler & Adler, 1987; Davies, 2008; DeWalt and DeWalt, 2011). Participant observation offered an intimate perspective of the P-TECH experience including the various stakeholders' roles as well as its organisational activities including funding, recruitment, partnership governance, and the unique challenges each school faces.

Field notes were written daily following each day of observation for the months of

February 2016, March 2016 and October 2017. The field notes were both descriptive and reflective (Bogdan & Biklen, 1982). The descriptive sections consist of detailed observations from classroom activities, recruitment events, mentor meetings, New York City Department of Education meetings, district meetings, and governing board meetings I attended for each school. The reflective section of each field note detailed my attitudes, thoughts about participants' experiences, anything I found interesting and general feelings about the day's activities and observations.

3.3.3 Interviews

Participant observation was particularly helpful in developing a sense of trust and rapport with students and educators which proved useful for interviews. Sixty individuals were interviewed primarily face-to-face for about one hour each on average. Two industry partner interviews were conducted through Skype due to distance and one over the phone due to company privacy regulations. The 60 interviews consist of twenty-eight educators, seventeen students, and fifteen industry partners. Figure 3.1 illustrates how many of each were interviewed at the different sites.

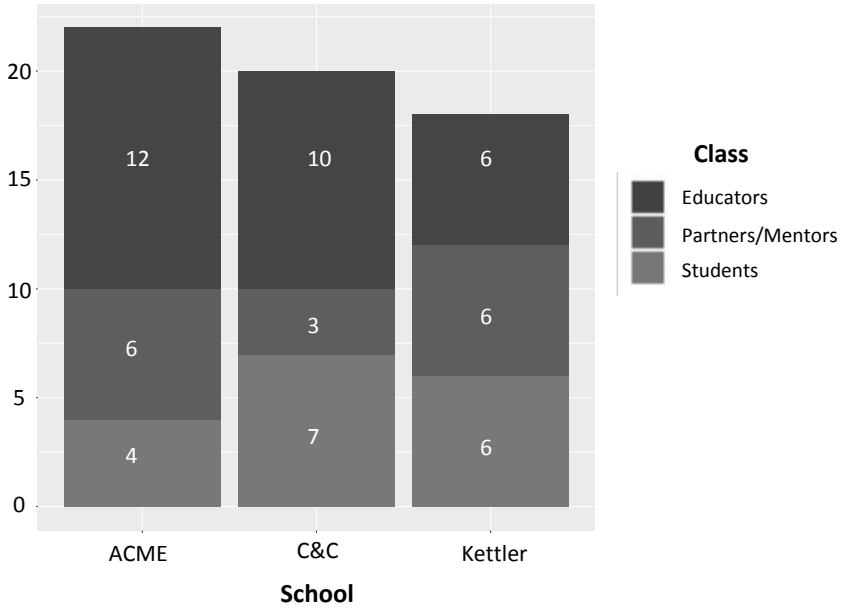


Figure 3.1 Distribution of interview participants

Figure 3.2 breaks this down further by providing an overview of who the participants were at each school.

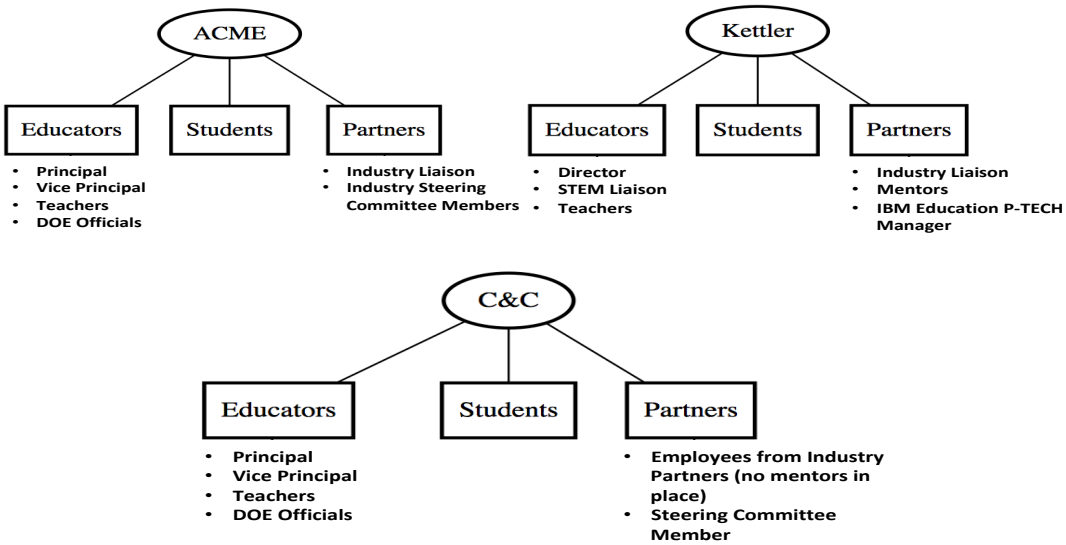


Figure 3.2 Taxonomy of interview participants

Several of the industry partner interviews were considered "elite interviews" based on their level of expertise and standing in their field (Marshall & Rossman, 2010). The elite interview participants were company executives including two directors of global education outreach and management and a corporate social responsibility manager. The participants were recruited through email and phone. They were chosen based on both their position at their company and appearance in the news articles and press releases collected for this study. The remaining industry partners interviewed were mentors and industry liaisons for each school and were recruited face-to-face when they were at the school or at mentor events. For the industry partner interviews that were conducted face-to-face, they took place at local coffee shops or at the local college campus after mentor events.

Student interviews were conducted at their respective schools either during study hall or lunch. Students were recruited in their classes and based on who returned the consent forms. Special attention was paid to the grade levels and efforts were made to include students from every grade. Unsurprisingly, the return rate for student consent forms was low but this is made up for through the extensive informal discussions and interactions I had with students at each school.

All educator interviews with the exception of four were conducted at their respective schools during their planning periods or lunch. The remaining four requested to be interviewed off-campus so they could have more time to talk. These interviews took place at local coffee shops. After each interview, I wrote memos following each interview which were used to aid in identifying emerging patterns related to the study's research questions (Silverman, 2013).

Qualitative interviews are understood as "naturalistic extensions of conversation" which provides the opportunity for participants to be placed as "partners in the research enterprise rather than subjects to be tested or examined" (Rubin & Rubin, 2005, p. 12). In line with this, the interviews were semi-structured and consisted of both closed and open-ended questions

because the topics were clear enough to have some predetermined questions, but enough room was left for probing beyond the given answers (Berg, 2004). All interviews were modelled after an "active interview" structure where, "production is spontaneous, yet structured—focused within loose parameters provided by the interviewer" (Holstein & Gubrium, 1995, p. 123). Flexibility was important in order to allow for a more relaxed conversational style interview setting, which is meant to encourage respondents to feel comfortable. Interviews with students were left until the last week of each visit in order to build rapport and trust (Rubin & Rubin, 2012). Even with guaranteed anonymity, as teachers, school administrators and companies are public facing and tend to be careful when discussing their opinions or reporting conditions that differ from what is publicly desired. To account for this, the interview protocol included questions designed to probe beneath these surfaces.

The focus of interviews depended largely on their role. Educators included teachers, principals, professors from the partner college, and local Department of Education employees. While there was also variation among these interviews based on their specific role and experience, educators were asked about their motivations for working at the school, their professional history, views on technology and education, along with various organisational questions such as professional development, funding, planning, as well as their opinions on the benefits and challenges of the model. Student interviews began with general background and interest questions before moving on to questions about their motivations for their school choice, technology usage and resources, future aspirations, and experiences with the school. Industry partners were asked questions pertaining to their background, roles, motivation for participation, benefits and challenges, and their views on technology, the economy, and education. Some key partners that were interviewed were chosen based on their prominence in the documents collected for the social network analysis.

The documents collected include online content such as press releases, news reports, blog posts and industry partner mission statements. These documents were systematically

collected from October 2014 until the completion of field work in October 2017. These documents were uploaded to NVivo in conjunction with field notes and interview transcripts to contribute to the understanding of the values and interests underpinning the P-TECH model, which helps to answer the study's first research question.

My final data set was comprised of documents, field notes, analytic memos, and interview transcripts. Because case study research generates a sizable amount of data from various sources it was important to maintain systematic organisation of the data to ensure the study's purpose and questions remained central for analysis. Once all data was collected I imported field notes, memos, documents, and interview transcripts into NVivo, designating separate folders for each. Ultimately, the use of multiple sources of data enabled data triangulation, which is discussed below and was intended for capturing different dimensions and perspectives within P-TECH.

3.4 Data analysis

The analysis for this study was iterative, continuous and multi-level. A noted risk with data analysis in case study research designs is that the diversity of data gathered can lead to the data being treated independently, which hinders the possibility of gaining a holistic understanding of the phenomenon being studied (Yin, 1984). In order to ensure a more holistic understanding I employed "constant comparison" as an analytical technique (Glaser & Strauss, 1967). Constant comparison involves organizing data into discrete 'incidents' that are then coded into categories that are meaningful to the aims of the research (Glaser & Strauss, 1967). This is done through simultaneous coding and analysis of the data and "by continually comparing specific incidents in the data, the researcher refines these concepts, identifies their properties, explores their relationships to one another, and integrates them into a coherent explanatory model (Taylor & Bogdan, 1984, p. 126).

3.4.1 Document analysis

The initial phase of analysis began once I started collecting media documents before field

work. As I conducted weekly online queries through a major search engine through the keywords “Pathways in Technology Early College High school” and the P-TECH blog, I started writing memos documenting any patterns, themes, or relevant news pertaining to the goals and values of the P-TECH model. Examples of these goals and values represented in the documents included an emphasis on twenty-first century skills, equity, and life prospects. After my final online search query for P-TECH news in October 2017 I uploaded all documents and memos to NVivo where I then coded and analysed them based on the coding scheme detailed below.

3.4.2 Social network analysis

Taking place concurrently during the initial stage of analysis, I conducted the social network analysis using Gephi, an open source network analysis software, before the start of field work. The social network analysis was used to highlight the organisational structure and key actors in the P-TECH network in a systematic way. The social network analysis was primarily intended to help understand the influence of specific actors within and across the P-TECH network. Social network analysis allows the researcher to identify previously invisible relations between actors and institutions (Borgatti et al, 2013). It does this through various centrality measures such as eigenvector, betweenness, and degree centrality, which are detailed further in chapter six. Through the social network analysis, I was able to identify individual actors’ relative positions and power within a network and deconstruct the institutional activities responsible for the overall organisational dynamics. It was also instrumental in the development of an understanding of how the macro- and micro-levels are co-constitutive. Lin (1982) states:

> The network orientation offers new approaches to describing and studying social structure and to dealing with the complex problem of integrating levels of analysis the manner in which individual actions create social structure; the manner in which social structure, once created, constrains individual and collective action; or the manner in which attitudes and behaviors of actors are determined by the social context in which action takes place (p. 10).

The findings were then used to inform the qualitative portions of the study after which all

data sources were merged for the final stage of analysis.

The collection of qualitative data took place from the beginning of field work in February 2017 until the end in October 2017. This phase included writing field notes, transcribing interviews and writing analytic memos based on observations and interviews. The final phase of analysis took place after all data collection was complete. This phase entailed coding the data in NVivo and conducting a thematic analysis on the dataset as a whole followed by further rounds of analysis to triangulate across data sources.

3.4.3 Fieldnotes and analytic memos

Field notes were written daily following each day of observation for the months of February 2016, March 2016 and October 2017. The field notes were both descriptive and reflective (Bogdan & Biklen, 1982). The descriptive sections consist of detailed observations from classroom activities, recruitment events, mentor meetings, New York City Department of Education meetings, district meetings, and governing board meetings I attended for each school. The reflective section of each field note detailed my attitudes, thoughts about participants' experiences, anything I found interesting and general feelings about the day's activities and observations.

Contributing to the iterative process of analysis, throughout the data collection I complemented my field notes with analytic memos. While memoing, I documented my reflections about the data I collected including my observations and both formal and informal encounters with students, industry partners, parents, and educators. In addition to my thoughts about the data I also used memoing to note any emergent patterns I suspected. The analytic memos were helpful in mapping connections and departures among the different sites. Figure 3.3 is an example of one of the analytic memos I wrote where I drew connections and departures between schools in terms of the principals' motivations and relationship with P-TECH and the school identities:

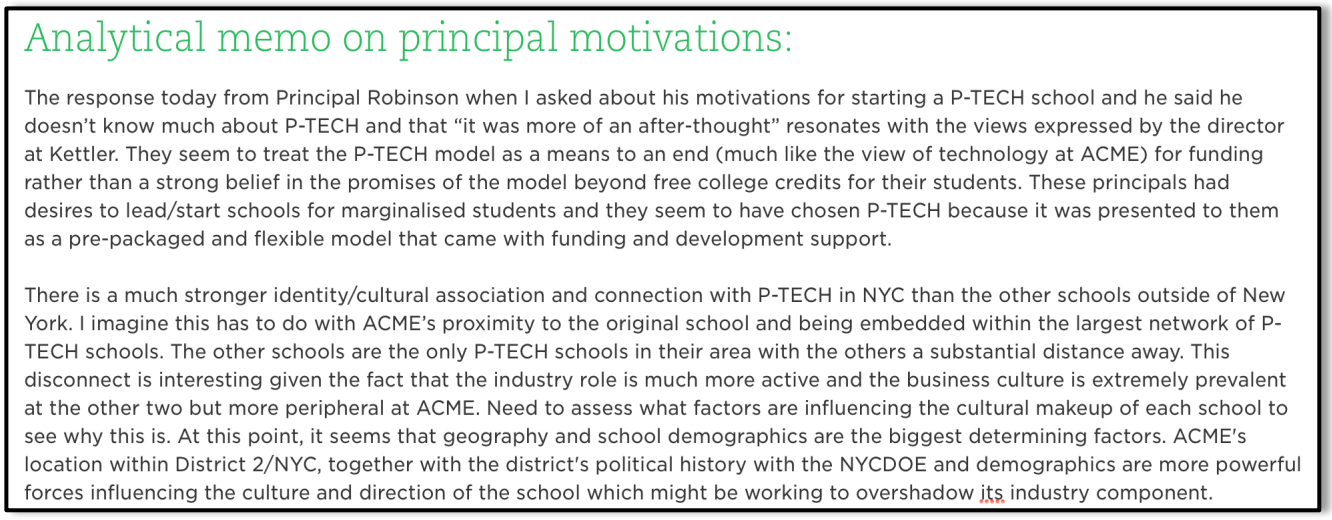


Figure 3.3 Analytics memo on principal motivations

Both the field notes and memos were also useful for contextualising what was said in the interviews.

3.4.4 Qualitative coding

All documents including, transcripts, field notes, and memos were coded using NVivo according to nodes relating to: motivation for participation, actors' activities, experience, and interests, organisational knowledge, future planning including student aspirations, and technology uses and resources. The final coding scheme developed out of a mix of pre-set and emergent codes. Pre-determined codes were informed by the study's conceptual and analytic framework and the research questions. The initial codes were primarily focused on capturing the relationship between private partners, the state, and the schools, organisational structure and governance, along with student motivations, interests, and aspirations. Emergent codes were determined by the frequency in which particular topics arose during the interviews. For example, "education attitudes" which is meant to capture all reflections on or relevance to participants' attitudes toward education was added as an emergent code once it became a recurring pattern in the interviews and across data sources.

Codes were refined throughout the coding process. Decisions to refine codes were based on both a lack of relevancy and codes needing to be broken down into sub-codes in order to

better organise the data. Notes including new ideas, interesting claims, and important connections were taken throughout the coding process to aid in the analysis (Taylor & Bogdan, 1998; Gibbs, 2007).

I completed three cycles of coding before progressing toward the final analysis. During the first cycle of coding I primarily focused on attribute coding, also referred to as "descriptive coding" (Richards, 2014), to help organise the data. Attribute coding includes basic descriptive information such as: the fieldwork setting and participant demographics (e.g. gender, socioeconomic status, and ethnicity). Attribute coding is a valuable data management technique particularly for studies with a wide range of data forms and ensures essential participant information and contexts are included in the analysis and interpretation stages (Mason, 2002; Saldaña, 2016). Rubin and Rubin (2012) argue that seemingly mundane attribute data has the potential to reveal organisational or hierarchical flows across sites within a study. This study's attribute data, including dates, names, and time frames was particularly helpful in highlighting unanticipated interrelationships between the field sites and actors within the larger P-TECH network, which also aided in building onto the social network analysis.

During the second cycle of coding I had developed a deeper understanding of the patterns in the data and was able to move toward comparing categories. I utilised simultaneous coding then sub-coding techniques as a way of detailing and organising data into categories and sub-categories. Simultaneous coding refers to when multiple codes are applied to a single qualitative datum (Saldaña, 2015). It is most appropriate when the excerpt has multiple meanings that justify more than one code (Dey, 1993; Saldaña, 2015). For example, when asking students why they chose the school they're at they often expressed that the school aligned with their future aspirations and warranted being coded under both "future aspirations" and "motivation for participation". Simultaneous coding was also useful for identifying and investigating interrelationships. If two codes were consistently being applied

together I would write a note to help guide the analysis further. I referred back to these notes during the analysis and ran matrix coding queries in NVivo to generate node matrices so I could further analyse the relationships.

3.4.5 Triangulation

Triangulation was a key component to the analysis. Popularised by Denzin (1970), triangulation can be used to incorporate different perspectives on an investigated phenomenon. It enables cross-examination of specific data from various sources through multiple methods in order to evaluate the consistencies and inconsistencies in the data (Patton, 1990). While its meaning and use is often contested and varied, it is mostly understood as a process of cumulative validation or as a means to produce a more holistic picture of what is being researched. As opposed to simply making up for the limitations of one method by incorporating another, triangulation is used less for the purposes of validating results and more as an alternative by increasing the scope, depth and consistency in methodology (Flick, 1992, 1998; Creswell & Clark, 2007; Creswell, 2008). While the social network analysis and qualitative analysis are presented as distinct analytical phases it is important to note that they were each used to inform the other throughout the analysis and ultimately merged together as part of the final analysis. The initial social network analysis was conducted before the field site visits and built upon throughout my time at each site as new information and names were brought up during the interviews. The initial findings from the social network analysis were used to inform my interview sampling procedures and questions for particular participants if the analysis showed a strong tie between two people I was going to be interviewing. I interviewed several key actors from the social network analysis who confirmed the results regarding who the key actors in the network are. Both sets of analyses were ultimately combined to answer the study's guiding research questions.

3.5 Trustworthiness, Credibility, Reliability

There have been several models proposed for qualitative best practices and for assessing

qualitative goodness (Guba & Lincoln, 1985; Seale, 1999; Denzin & Lincoln, 2005; Creswell, 2008; Tracy, 2010). Scholars like Guba and Lincoln (1985) have persuasively argued for a list of criteria that are more appropriate and helpful safeguards to ensure validity and reliability in qualitative research. Instead of validity, reliability and objectivity, Guba and Lincoln (1985) propose 'trustworthiness' criteria which are based on credibility, transferability, dependability and confirmability.

The memos written throughout data collection aided in establishing credibility, which is analogous to internal validity, and contributed to the trustworthiness of the study by providing a record of the meaning-making processes developed throughout the research. The use of participant-observations also strengthens credibility because activities occurring in their natural setting can be followed-up on with the participants themselves. Additionally, this study's incorporation of multiple methods allowing for data to be cross-checked is a recognised safeguard for credibility as well.

In terms of generalizability, Guba and Lincoln (1985) offer the term transferability, which is achieved in qualitative research through thick description. According to Geertz (1973), thick description entails description that goes beyond the surface and highlights the context that gives information meaning.

> The aim is to draw large conclusions from small, but very densely textured facts; to support broad assertions about the role of culture in the construction of collective life by engaging them exactly with complex specifics. (Geertz, 1973, p. 321)

Another critique often ascribed to case study research is that the closeness between the researcher and participants biases the analysis. However, this closeness actually allows for more contextualisation, which enables the researcher to report more details about the phenomenon being studied. In fact, a benefit of case study research is that it allows researchers to immerse themselves in the context of the phenomenon being studied thus garnering rich data, which is one way to achieve external validity (Lincoln & Guba, 1985; Maxwell, 1992). Ultimately, this research design being multi-sited contributes to meeting all

of these measures of quality because, multi-sited case studies are "considered more compelling, and the overall study is therefore regarded as more robust" (Yin, 2003, p. 46).

3.6 Ethical considerations

Ethical considerations for this study are informed by the understanding that ethics and methods are interrelated (Ortega, 2005; Eynon, Fry and Schroeder, 2008) and that ethical procedures are contextually dependent on particular sites and actors. As such, ethical considerations were an ongoing and reflexive part of the entire research process including the write-up portion of the project. The use of a reflexive approach encourages researchers to question their own values, attitudes and assumptions in an attempt to understand our position in relation to others (Bolton, 2010). This is particularly valuable because my own subject position as a researcher is burdened with power relations that are not all readily apparent (Foucault & Gordon, 1980) but adopting a reflexive approach helps bring this awareness to the forefront of the research process and theoretically lessens the risk of engaging in practices that might marginalise groups further. Indeed, Alexander (2011a) recognises "reflexivity as an act of political self-awareness" (p. 105). Taking into consideration the specific context and nature of doing research in secondary schools and the public private partnership model these were based on, there were three primary ethical concerns raised: working with youth, identity protections, and sensitive company information.

In addition to gaining ethical clearance by the Central University Ethics Council (CUREC), I was also required to submit a separate Institutional Review Board application to the New York City Department of Education then complete a background check and be fingerprinted before entering their schools. Once I was in the schools I asked each teacher for permission to observe their classes. All teachers were given observation consent forms with information sheets that outlined the aim and scope of this research before giving their written consent to have me sit in on their classes. Each teacher was also asked if they would be

willing to be interviewed based on what they read in the information sheets and were given separate consent forms for interviews.

The voice of the students is a critical component in this research. The students in this study are recognized as a vulnerable group because they are under the age of 18. As such, all students were sent home with information sheets and consent forms as well for their parents to sign. The students that returned the consent forms were then asked if they minded being interviewed before scheduling and again when each interview began. I was particularly cautious and aware of the potential for students to feel obliged to participate due to traditional adult-child relations (Morrow & Richards, 1996) or excluded if their parents did not give consent. In order to mitigate the issue of feeling obligation, I reassured each student multiple times that it was ultimately their choice and there were no repercussions if they did not want to participate. The issue of exclusion was not considered a problem because the majority of students were not interviewed.

In addition to the sensitive nature of conducting research with youth, I interviewed private partners and attended board meetings with the New York City Department of Education where sensitive information and data were shared. One company required me to submit my ethics forms and interview guide to their legal team before interviewing their employees. I took a series of precautions to protect the identities of all research participants and obliged with all requests to exclude specific quotes and details. In order to protect participants' anonymity and ensure confidentiality, all names, including the schools, were replaced with pseudonyms and any identifying characteristics that could be used to trace a participant or school were excluded. Additionally, the regions rather than cities where only one P-TECH school was located were used. New York City is the only exception and this is because there are many P-TECH schools in the city. Specific occupation titles were made more general in order to further disguise the participants' identity.

One unanticipated ethical concern that arose during my field work was the issue of power imbalances within each site. Despite me insisting that I be the only one asking for permission to speak with teachers the principals were eager to be more involved with my time at their schools and took the liberty of approaching teachers before I arrived. Once I entered the schools I made a point to introduce myself to every teacher and explain my project before asking permission to observe their classes and interview them. Upon finding out that the principals had already asked I made it clear that they were under no obligation to have me in their classes or speak with me and that the principals would not know which teachers I was speaking with so there were no negative repercussions. This was only an issue at one school where several teachers explained that they were fearful of being fired and that there was a clear division between the local Department of Education and teaching staff. In this case, I made sure to not include those teachers and only spoke with them informally. The tensions and details of this hierarchy and my role are detailed in chapter six.

3.7 Conclusion

The decisions underlying the construction of the research design, determining the most appropriate methods and analytic strategies for this study were dependent on the purpose and questions guiding it. Each method was chosen based on the information needed to answer the research questions and those most appropriate for enabling the collection of rich meaningful data. The flexibility that comes with case study research and its ability to deal with a large amount of data from a variety of sources was particularly well suited for answering the research questions and garnering a deep understanding of the organisational and governance structures involved with the P-TECH network. The remaining chapters describe and analyse the political, economic, social and cultural elements of P-TECH as they relate to the guiding research questions. The next chapter presents the findings from the social network analysis which detail the organisational structure of the P-TECH network including key relationships influencing the spread and sustainability of the model.

Chapter 4 Social Network Analysis of the P-TECH Model

This chapter reports the findings from the social network analysis (SNA) portion of the study. Social network analysis is a quantitative method used to analyse relationships between individuals or ogranisations. It is based on the understanding that an individual's, or group of individuals', position(s) within a social network determines the flow of information and resources they have access to (Freeman, 2004; Borgatti & Ofem, 2010). It is important to note that the unit of analysis in SNA is the network as a whole, consisting of actors and their relations to others in the network, rather than the individuals comprising the network. The SNA makes it possible to identify the most important actors in the P-TECH network. As such, the purpose of the SNA was to map and explore the structure of the P-TECH network in order to draw quantified inferences regarding who has control and influence over the network. This allowed for relative comparisons between the actors and organisations involved with P-TECH to be made. It is also used together with the qualitative assessments of this study to help provide a more holistic understanding of the inter-workings of the model and its rapid expansion. Through this, it was shown how and why P-TECH gained such prominence and what this says about the influence technology companies have over the K-12 system.

Beyond simply unveiling the patterns of the ties, through different centrality measures the use of SNA is particularly valuable for understanding the dynamics of the ties between individuals in a social network (Otte & Rousseau, 2002). As stated previously, SNA in this study is most helpful in answering the extent to which the P-TECH model is reflective of the values and interests shaping the K-12 system in the 21st century. It does this specifically by mapping ties between individuals in the P-TECH network and organisations as well as individuals tied to other individuals. The SNA findings were used to inform interview questions with key informants who were on the original P-TECH steering committee in order to see if the SNA findings matched the personal experiences and perceptions of key actors'

prominence and roles in the network. As the chapter will show, the interviews did confirm the findings of the SNA thus providing further validation of the analysis. The data sources, networks, and methods are outlined before the findings and their significance are discussed.

Before moving forward, it is essential to briefly outline the formal concepts, measures, and constituent elements of SNA in order to understand the findings and how the conclusions were drawn. The most basic and important concept within SNA is that of the *node*. Each node represents an actor within a network. Nodes can be individuals, organisations, or other entities. For example, IBM, Kettler High School, Sam Palmisano, and the City University of New York are all different nodes within the P-TECH network. A single network may consist of multiple types of nodes (e.g. person and organisation), in which case it is referred to as a multi-modal network.

SNA has been used to unearth the structural patterns of connections between actors and social systems. These connections or relations between nodes are referred to as *edges* but are often called ties. They can be directional, meaning the relationship between the nodes can be one-sided, such as a tie like "has romantic feelings for" which can be held by one or both of the nodes in a connection. Similar to nodes, there can be multiple types of edges in a single network. Networks including multiple types of edges are called multi-plex networks. Networks consisting of various types of nodes and edges are referred to as multi-mode multi-plex, or meta-, networks (Carley, 2005). A *component* in SNA is used to refer to disconnected parts where there is no path from one node or a set of nodes to another set of nodes. Finally, an understanding of the importance of particular nodes within a network, as well as how they are important, is gained through measures of *centrality*, which I discuss below in more detail.

As discussed throughout, there continues to be sustained investment and interest in ICT-driven education models without the evidence to support the proposition that they are achieving their aims, which begs the question as to why the investments persist and models

continue to proliferate (Friesen, 2008; Selwyn, 2016; Sims, 2017). The underlying logic that these initiatives and models are based upon derives from techno-optimism where ICTs are heralded for their potential to bring about equality and are seen as a force for positive social change. In order to gain an understanding of why investments and policy support for these models continue to persist, it is important to position the current political economic context in which these initiatives exist at the centre of the analysis. To begin to understand what the implications of these initiatives and the underlying values are, the network analysis results are assessed alongside the characteristics and forces of digital capitalism. This way, a more holistic understanding of what forces are at play at the structural level can be gained. By looking at the interrelationship between the state, industry, and civil society in the context of P-TECH through the application of SNA alongside digital capitalism as an understanding of the findings, it becomes clearer how the P-TECH model is reflective of the values and interests shaping the K-12 system in the 21st century. It also reveals who has control over the current shift taking hold of the US K-12 public education system. In sum, this approach helps to unveil what the ideological underpinnings of the model are.

Overall, this chapter demonstrates how social networks play a significant role in determining how the P-TECH model received so much attention over the many other new models implemented across the country each year. It also unveils how control or influence over the contemporary K-12 education system is unequally distributed between the state, private sector, and civil society, with the technology industry enjoying the majority of it. The SNA methodology exposes the hidden structures impacting P-TECH's rapid expansion and success in garnering praise from high profile officials. I ultimately argue that this is propelled by forces of digital capitalism and aided by the enthusiasm surrounding the perceived potential of ICTs to ameliorate social inequalities, improve life outcomes, and spur economic growth. While more details emerge throughout the following chapters that bolster the overall argument, at this point some striking patterns in the data have become apparent.

4.1 Data collection and network descriptions

While a brief description of the data sources and rationale underlying the use of SNA in this study was presented in the previous chapter, it is useful to provide a more in-depth overview in the context of the SNA findings. A critical consideration with SNA is where and how to demarcate the boundaries of the network. Sampling is largely dependent on the research question and social phenomenon being studied. The three networks analysed in this study are outlined in Figure 4.1 below. The first network is referred to as the Schools x Partners network (#1 in Figure 4.1) and it is composed of all P-TECH schools and their partners (industry, district, and college). The data was exhaustive, which provided a logical boundary for my analysis. The data was collected from the P-TECH website which lists all P-TECH schools and their partners.

The second network is the Individuals x Individuals network (#2 in Figure 4.1) and it is comprised of key individuals involved with P-TECH. The data for this network derived from the P-TECH related media data collected weekly from October 2014 until November 2017 It is important to note that I conducted a broader search during the first week of data collection so the articles date back to 2011 which is a year before the first P-TECH school opened. The individuals included in the network include all individuals mentioned in each article. Each name was documented manually and each co-appearance where multiple individuals appeared in articles together were tabulated. Centrality measure rankings ultimately determined who the key individuals in the network were. This information was then used to inform interview questions for the individuals from the original steering committee that I spoke with in order to see if they matched their personal experiences and perceptions and to see if they felt any key individuals were missing from the network.

The third and final network is the Partners x Individuals x Organisations network (#3 in Figure 4.1). This includes the top ten partners from the first network, all key individuals from the second network, and key organisations connected to P-TECH. The decision to include

key organisations was made due to their prominence in press releases related to the launching of P-TECH. Ties between these organisations and other nodes, regardless of type, reflect that those nodes are members of the organisations.

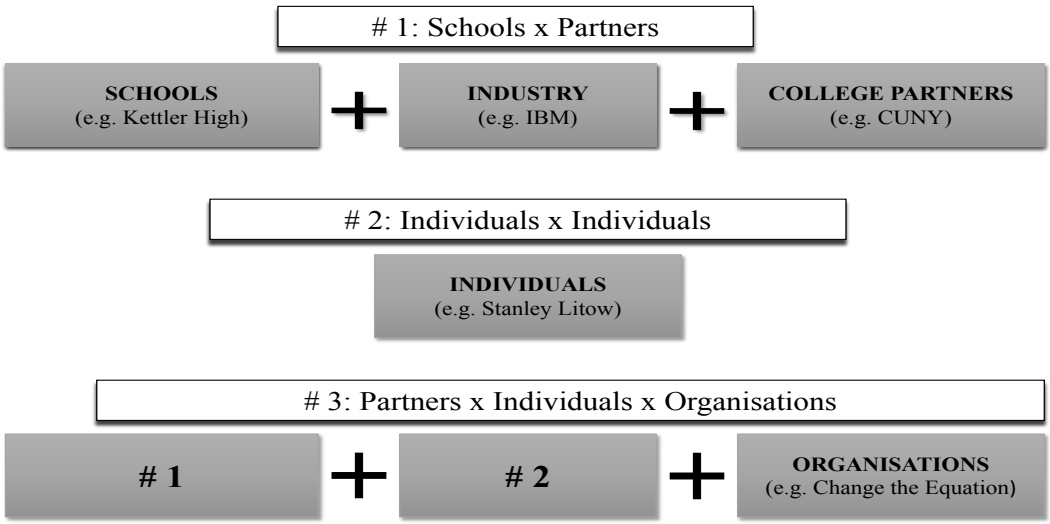


Figure 4.1 Taxonomy of the three networks analysed

All ties in the network are unweighted because these are binary relationships meaning they are either connected through partnerships and/or memberships or they are not. The individual ties were the only edges that could have been weighted given the nature of the ties, however, weighting these could have artificially inflated the strength of some relationships due to multiple reports for the same event and by the prominence of certain high-profile actors in the media. As an example, Barack Obama was reported in many of the articles so he could have been inaccurately identified as the most essential individual in the P-TECH network.

When all the node- and edge-types are combined, the full network of analysis for this study is a multi-modal, multiplex network comprised of P-TECH schools, higher education partners, corporate partners, key organisations and individuals. The parameters for the connections between individuals, partners and organisations were based on the following empirically identifiable relations:

- Organisations were connected to partners based on partner membership in the organisation. If the partners held formal membership in an organisation they were included.
- Individuals were connected to organisations if they were members of the organisation whether it is in an advisory role on governance boards, fellowships, or employment.
- Individuals were connected to other individuals based on their appearances in P-TECH articles and events they attended together, which was also found through media documents.

The selection was intended to be systematic and replicable so as not to introduce researcher bias in the choice of what was included in the network.

A notable limitation with SNA is sampling bias (Borgatti et al., 2006). While the P-TECH schools included in the network are exhaustive there is a risk of leaving out certain individual agents in the network. However, given the way the data were collected I am confident that all major individual actors have been included. If individuals were left out of the network it is because they do not play a significant role or they would be included in the media content or mentioned by the other key informants that were interviewed for this study.

To summarise, the network has 292 nodes with 324 edges and 10 components. There are two different types of nodes, organisations and individuals. Edges between schools and partners represent a formal partnership, ties between individuals and any organisational node represent that the individual is a member of the associated organisation. Ties between organisations and partners indicate that partners are members of the key organisation.

4.2 Measures

Once data were collected I grouped networks by node type so that I could run standard measures of centrality that are readily interpretable, including eigenvector, betweenness and degree centralities, which are explained below. I performed my initial analysis on the Schools

x Partners network focusing on the main component which contains 82.53 per cent of nodes[1]. This allowed me to run quantitative measures to understand the prominence of certain partners. I then built the Individuals x Individuals network. From there, I qualitatively analysed the multimodal and multiplex Partners x Individuals x Organisations network in order to see the key actors and decision-makers behind the P-TECH model. The results are organised by network following the above-mentioned order of analysis.

4.2.1 Measures of Centrality

With network analysis the positionality of nodes or the relation between nodes is very informative and can tell us the relative prominence of specific actors in a network. An actor's importance in a network is based on how highly connected they are and where they are located in the network (Borgatti et al., 2013). This is captured through different centrality measures. A brief overview of the standard measures of centrality used in this study is presented below followed with details for each specific network.

4.2.1.1 Eigenvector centrality

Eigenvector centrality shows how well connected a node is to other well-connected nodes (Borgatti et al., 2013). It gives the relative value of an actor in a network based on whom they are connected to. If an actor is tied to another actor that is central in the network then this actor is understood to have a high degree of influence over the network. In this study, because of the structure of the network and the nature of the ties, Eigenvector centrality did not turn out to be very useful. It is still included because it did provide important insight regarding the true significance of IBM in the network which is explained below. Overall, the results of the analysis showed schools having a disproportionately high Eigenvector centrality relative to their true importance to the network simply because of the amount of ties the schools have. Thus, Eigenvector centrality is confounded here by degree centrality.

[1] Idaho P-TECH schools were excluded because their database did not differentiate between formal partnerships and supporters and it was not clear which schools were associated with each industry partner.

4.2.1.2 Degree centrality

Degree centrality is simply the number of ties a node has to other nodes in a network (Borgatti et al., 2013). As ties in a network can be either directed, where relationships can imply either unidirectional (e.g. A likes B but B does not like A) or bi-directional (e.g. A likes B and B likes A) relationships, or undirected, where ties either exist or not, there are three types of degree centrality, in-degree, out-degree, and total degree centrality. All networks in this analysis are undirected and consequently all measures of degree centrality are total degree centrality. Because of the structure of the network, degree centrality measures in the P-TECH network are severely skewed in the direction of schools because they have multiple partners where very few partners have multiple connections to schools.

4.2.1.3 Betweenness centrality

Betweenness centrality is the most useful and important centrality measure for this study particularly in helping to answer its question regarding who is influencing the current shift taking hold of the US K-12 system. Betweenness centrality measures the number of shortest paths a node is on and is generally understood as a measure of control or high influence over the flow of information and resources in a network. Actors positioned between other actors in the network have the ability to either block or help advance communication between other actors, thus maintaining their level of control and influence in the network. It demonstrates which actors occupy the most important roles in a network.

Depending on the features of the network being analysed, the measures of centrality have varying significance and interpretations. However, as explained above, due to the nature of the network, Eigenvector and degree centrality measures were not particularly useful. The findings presented here primarily focus on betweenness centrality as it was the most informative centrality measure given the nature of the network and its ties. The other centrality measures are included in the discussion here because correlations and discrepancies between each centrality measure findings hold valuable insight. Consequently, the findings

for betweenness centrality are presented and discussed alongside the corresponding graphs below.

4.3 Findings

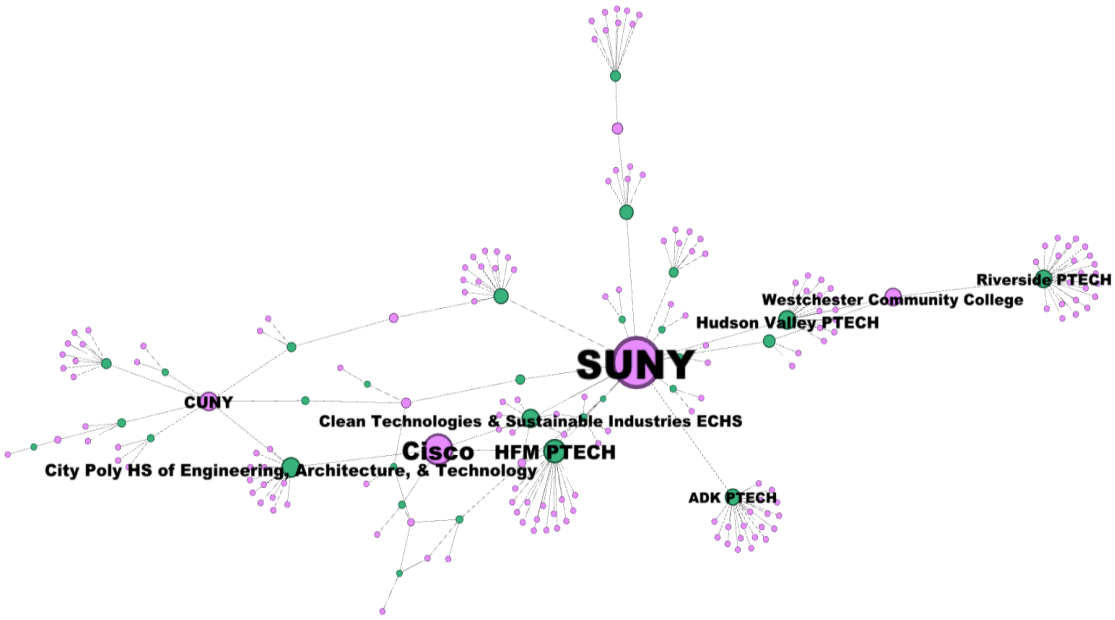


Figure 4.2 P-TECH schools and partners with nodes sized by betweenness centrality

Figure 4.2 shows the main component of the P-TECH network, the Schools x Partners network (network #1), which encompasses 82.53 per cent of all nodes within the network. Any schools and partners that were not connected to the main component were removed from the analysis. Those removed were almost exclusively rural P-TECH schools far outside New York City but also included schools in states other than New York. The decision to exclude these was based on the fact that these islands of nodes say little about the core of control and influence in the network. It can be inferred from the lack of connections that if they were influential they would be tied to the main component or at least to nodes outside of themselves.

As shown in Table 4.1 below, on all measures of centrality that were run, including Eigenvector, degree, and betweenness centrality, the State University of New York (SUNY) ranked first. Again, those with the highest betweenness centrality are understood to have the most control and access over the flow of information and resources within the P-TECH network. Given this, it is interesting to find that SUNY has a much higher betweenness centrality (0.749) than the City University of New York (CUNY) (0.223) considering CUNY was the original partner of the P-TECH model. Also of note is that if you remove SUNY from the network the main component breaks apart.

Table 4.1 Top ten partners in the P-TECH network

	Name	Betweenness	Degree	Eigenvector
1	SUNY	0.749	15	1
2	Cisco	0.225	4	0.335
3	CUNY	0.223	7	0.213
4	Westchester Community College	0.208	3	0.275
5	Canton-Potsdam Hospital	0.097	2	0.086
6	IBM	0.081	4	0.078
7	National Grid	0.070	2	0.109
8	Center for Economic Growth	0.047	4	0.314
9	City Colleges of Chicago	0.023	4	0.069
10	Microsoft	0.020	2	0.027
	MEAN	0.174	4.700	0.251
	MEDIAN	0.089	4	0.161

The prominence of SUNY is particularly interesting and was discussed further during my interview with Mr. Chlarson, the head of CUNY partnerships and member of the P-TECH steering committee. SUNY is more widely embedded in the P-TECH network because it has many more P-TECH connections. However, it was still surprising to find that it ranks higher than CUNY. The ties between the interpersonal network, the state government, and SUNY are particularly strong and can best explain SUNY's prominence in the network.

When I brought up SUNY's prominence in the P-TECH network according to my analysis, Mr. Chlarson reiterated that it is most likely due to personal relationships and the connections between IBM, New York government officials, and SUNY. Indeed, when looking at the political context of New York and its government's longstanding relationship

with IBM, it becomes less surprising that these tensions exist and that SUNY would gain more control over the P-TECH network. When looking at the articles collected for the analysis, I noticed many were joint-released with SUNY and IBM. In one of the articles they announced that Stanley Litow, IBM's Vice President of Corporate Citizenship and Corporate Affairs and recognised architect of the P-TECH model, sits on the Board of Trustees for SUNY. IBM has also recently established an innovation centre for its research arm at one of the SUNY campuses. To further illustrate the interrelationship between the New York State government, SUNY, and IBM, a few years ago Governor Cuomo's administration secured an agreement with IBM that the company would bring hundreds of IT jobs to Buffalo in exchange for a $55 million investment (Bragg, 2018). Additionally, former IBM employees currently run the state Office of Information Technology Services. Ultimately, SUNY's prominence in the network has been determined and shaped by these interpersonal ties and New York's political context.

During my interview with Mr. Chlarson, he also discussed the reasons behind IBM initially seeking the original partnership with CUNY rather than SUNY. In the interview he explained, "There is only one SUNY college in the five boroughs. So, it wouldn't have been practical for them to partner with SUNY". It does make practical sense that IBM would implement the P-TECH model in New York City given the size of the district and the fact that IBM's headquarters are located just 42 miles outside of it. Establishing the model in NYC also made the most sense financially because the NYCDOE is more financially well-resourced than SUNY. Mr Chlarson then added, "it probably seemed like a natural fit given the population of students that would be recruited". As the following chapters will show, the model's focus on serving predominantly low-income and underrepresented students has shifted to include a wider range of students regardless of class, race, or ethnicity. However, this is still considered by IBM and P-TECH stakeholders to be a central aim of the model and continues to be promoted by IBM.

Another surprising finding from the analysis had to do with IBM's betweenness centrality and degree centrality measures. Looking at the industry partners from Table 4.1, IBM, while still central in the network, does not appear as prominent as suspected given the fact that it is their model. Their relatively low degree centrality (4) is interesting to note because one would imagine that IBM would be partners with more schools driven by their own design. To better understand the finding that IBM seems relatively unimportant to the network based on measures of centrality, I looked into individual ties. Figure 4.3 below shows the Individuals x Individuals network with the nodes sized by their betweenness centrality.

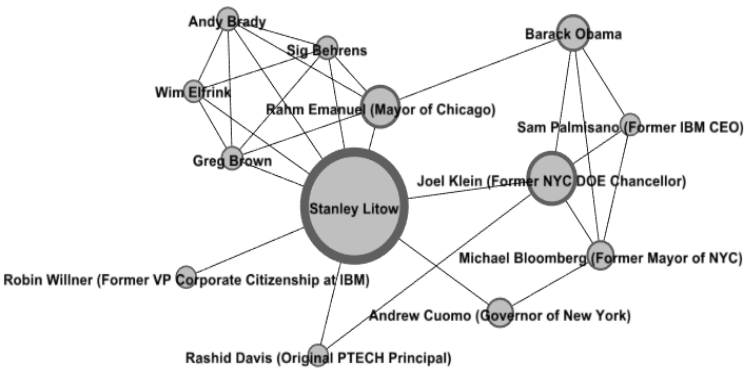


Figure 4.3 Individual connections within the P-TECH network sized by betweenness centrality.

The Individuals x Individuals network has thirteen nodes. The most interesting finding with the Individuals x Individuals network is how connected Stanley Litow is. Betweenness centrality is the most telling measure of centrality because it shows that Stanley Litow, with the highest betweenness centrality ranking, is controlling the flow of information in the P-TECH network. Table 4.2 shows that the average betweenness centrality in the network is .073 and Stanley Litow's is .502. Given that this is a normalised betweenness centrality, this is a significant difference.

Table 4.2 Individuals' centrality measure rankings

	Name	Betweenness	Degree	Eigenvector
1	Stanley Litow	0.502	9	1
2	Joel Klein	0.170	5	0.463
3	Rahm Emanuel	0.111	5	0.743
4	Barack Obama	0.076	4	0.368
5	Andrew Cuomo	0.038	2	0.266
6	Michael Bloomberg	0.038	4	0.291
7	Sig Behrens	0.007	5	0.787
8	Greg Brown	0.007	5	0.787
9	Andy Brady	0.007	5	0.787
10	Robin Willner	0	1	0.200
11	Sam Palmisano	0	3	0.245
12	Rashid Davis	0	2	0.300
13	Wim Elfrink	0	4	0.663
	MEAN	0.073	4.154	0.531
	MEDIAN	0.007	4	0.463

The Schools x Partners network from Figure 4.2 showed that IBM did not score high on centrality measures. However, when examining Stanley Litow and his connections, it becomes apparent that IBM (through Stanley Litow) is more influential in the P-TECH network than the Schools x Partners network would suggest. This begins to illuminate the importance of strategic alliances between individuals and how the interrelationship between the government and industry serves as an explanation for P-TECH's prominence and influence. For example, within just one degree he is tied to the governor of New York, the former mayor of New York City, and the mayor of Chicago; within two degrees, he is tied to the President of the United States and the CEO of IBM. Most recently, Stanley Litow was also appointed as Chair of the Common Core Implementation Panel by New York Governor Cuomo. Moreover, Joel Klein, credited with formulating the idea of P-TECH with Sam Palmisano (former CEO of IBM) ranks second on betweenness centrality (0.170). Interestingly, Joel Klein was the Chancellor of the NYC Department of Education and a potential candidate for Secretary of Education under the Obama Administration (Gootman, 2008). Rahm Emanuel, Mayor of Chicago, ranked third on betweenness centrality (0.111) and served in the Obama administration as the White House Chief of Staff (Baker & Zeleny, 2009). Joel Klein's influence in both political and educational spheres of society was brought

up by another steering committee member during an interview. The steering committee member, an employee from the former Office of New Schools, said “Joel Klein’s reach is far and deep. He has his hands in everything. I’m not surprised he ranked high, he’s well connected on all sides.”

Overall, the network analysis shows that by just looking at the primary network and measures of centrality, IBM is relatively unimportant. However, when taking a closer look at the actors within IBM it becomes clear that they are well-connected both interpersonally and organisationally. Moving out from the core organisations in the network the scope of influence of notable IT sector corporate actors through their connections to high-profile government officials becomes more clear. Figure 4.3 illustrates how certain central actors serve as a medium through which critical partnerships are formed.

Highlighting these connections within the Individuals x Individuals network helps provide evidence as to why P-TECH has received so much praise from high-profile officials such as President Obama and Secretary of Education Arne Duncan before having a graduating class. Indeed, the key actors in the P-TECH network all have close ties to prominent government officials and signalling the continued blurring of private and public sector boundaries, they themselves have held roles in both private and public sectors. When considering how many models and initiatives get proposed or implemented each year, the P-TECH network demonstrates how interpersonal ties play a key role in determining their prominence and spread.

Interpersonal ties also determine the links between organisations. When the network demonstrates ties between two organisations it is often indicating interpersonal ties. Figure 4.4 presents the third and final network of the SNA which is the Partners x Individuals x Organisations network.

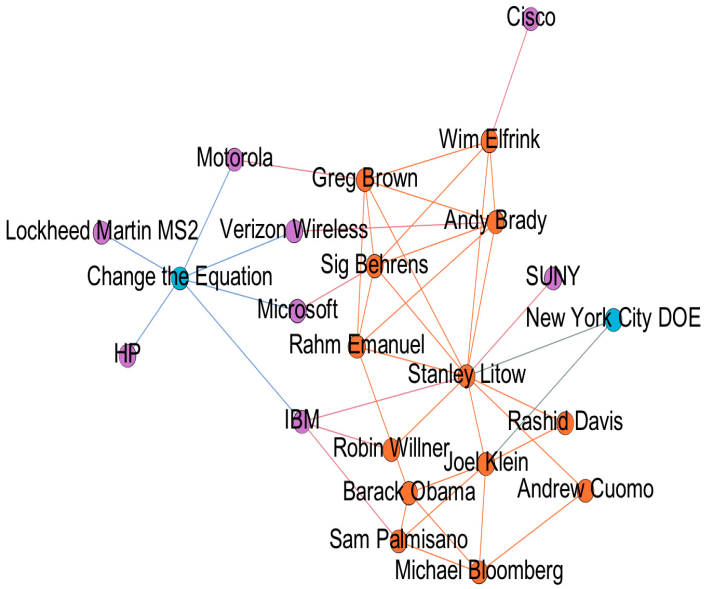


Figure 4.4 Partner x Individual x Organisations network

After analysing the Individuals x Individuals network it was important to see what organisations they were tied to in order to understand what the individual connections say about the greater P-TECH network. When analysed qualitatively in conjunction with the media content data, more compelling patterns become clear for understanding why the P-TECH model has been so prominent without longitudinal evaluations to assess its efficacy.

An important element to note with this network is that there are several ties to an organisation called Change the Equation. Change the Equation is an organisation made up of a group of CEOs working with schools, states and communities to improve STEM policies and programs. It is the result of a call to action from President Obama to ensure students are being equipped with STEM skills (Department of Education, 2014) and shows a concerted effort by the private sector to help shape public education and P-TECH is one initiative demonstrating how technology sector actors are given a direct pipeline through the views and use of ICTs. While this is simply a case study of P-TECH and therefore not representative, it is clearly indicative of this trend in education, which is supported by other initiatives such as Change the Equation.

Another important element to note from Figure 4.4 is that individuals from the private sector in the P-TECH network are all tied to ICT companies including IBM, Microsoft, Motorola, Verizon, and Cisco. This would not be surprising if the majority of P-TECH industry partners were actually ICT companies. Instead, the partners are made up of a wide range of mostly local industries including manufacturing, healthcare, and clean energy. The fact that ICT companies play such a central role and are vital to the network shows the dominance of this industry and why digital capitalism as an explanatory tool for the shifts gripping the US K-12 education system needs to be taken seriously.

4.4 Digital Capitalism

As discussed in chapter two, this study adopts the understanding that we have entered a distinct socio-technological epoch that has evolved from the Industrial Age to the Information Age. Utilising Castell's characterisation of today's society as the network society, it is understood that the current social structures organising society have been brought about by the advent of ICTs (Castells, 1996). The network society is constituted by "the interplay between relationships of production and consumption; relationships of experience; and relationships of power" (Castells, 2002, p. 7). In order to understand its structure and organisation, the political, economic, social, and cultural aspects of society must be taken together as interrelated and co-constituting elements (Castells, 2002). In the context of P-TECH and assessing the interrelationship between the technology industry, state, and civil society, the theory of digital capitalism applied alongside the SNA findings offers valuable insights that help to explain why P-TECH received so much publicity and praise before having any data to support that it is achieving its aims. Taken together with the SNA findings, digital capitalism also helps in providing insights for the study's first research question that asks: How are the values and interests underlying the P-TECH model influencing the K-12 system today?

Serving as a reminder from chapter two, digital capitalism has come to signify various phenomena relating to the effects of ICTs and capitalism including: changes in systems of ownership (Schiller, 1999); technologies of production (Fuchs, 2013); labour practices (Qui, Gregg, & Crawford, 2014); and corporate management techniques (Wajcman, 2015). The thesis of digital capitalism is that there has been a distinct shift in the global political economy that now caters to corporate interests through market-driven communication policies evolving out of the 1980s policy ecosystem. It is the deregulation era that enabled ICTs to be exploited for commercial use. Importantly, the 1980s deregulation policies, in conjunction with technological advances, brought about ideological shifts and marked the beginning of the reconfiguration of relations of power in which industry has gained more political influence.

According to Schiller (1999), digital capitalism is ultimately used to represent the merging and strengthening of corporate relations through the commodification of information, which is driven by power. Rather than crediting digital capitalism as something that is *causing* structural developments, it is more appropriate to conceptualise digital capitalism acting as a mediation between digital technologies and a capitalist economy from which these shifts are occurring. In this way, digital capitalism encompasses a collection of processes, sites, and a historical moment. With this in mind, it is clear that digital capitalism is not responsible for the corporatisation of education but is aiding its acceleration. When applying this understanding to the context of P-TECH, it offers compelling explanations for the rise of ICT-driven education initiatives, models, and investments. Digital capitalism is also useful in explaining how and why technology companies like IBM have gained more direct influence in public education through the P-TECH model.

While the impact of digital capitalism is far reaching across many sectors globally, its influence on education systems is particularly acute. P-TECH, being pioneered by a major technology company, IBM, in partnership with K-12 public schools and community colleges,

presents itself as an exemplar for assessing how digital capitalism is working in education today.

As outlined in chapter two, some central characteristics of digital capitalism in education include increased privatisation, the blurring of public and private spheres, commodification, vocationalisation, and techno-venture philanthropy. Each of these is discussed more in-depth alongside the study's overall findings in chapter eight but in the context of the SNA findings, the remainder of this discussion engages with P-TECH and these characteristics of digital capitalism.

Privatisation in education encompasses a broad range of processes and its implications are varied and far-reaching. Privatisation in education is generally meant to refer to the introduction of private sector participation in education and shifting public education toward business-like models. Ball and Youdell (2007) make useful distinctions between privatisation *of* and privatisation *in* public education that are both appropriate for assessing the influence of digital capitalism at P-TECH. Privatisation *in* public education is referred to as "endogenous privatisation" and it represents the transfer of values, ideas, and practices from the private sector to public education in an attempt to model it more like business (Ball & Youdell, 2007, p. 8). The privatisation *of* public education is called "exogenous privatisation" and it represents the education system as a whole being opened up to the private sector for supplemental education management and resources on a for-profit basis (Ball & Youdell, 2007, p.9). It is already clear how P-TECH represents the growing tendency amongst governments to increase private sector involvement in public education. Digital capitalism's role in this comes from the fact that the part of the private sector gaining prominence and influence is coming from giant technology corporations. The SNA reveals that key interpersonal ties and the revolving door between industry and government are aiding in the progressive blurring of public and private sectors and enabling companies like IBM to gain entrance and further entrenchment in public education.

As stated above, the key takeaway from understanding digital capitalism is that it represents a shift in the global political economy where previously public goods and institutions are increasingly being shaped by and catered to corporate interests through market-driven communication policies, including those pertaining to ICTs. It has been made clear that the current education reform policies and goals are market-based. It has also been made clear how the state is encouraging public schools to increase partnerships and dependency on the private sector due to budget constraints. These, along with the widespread concern over the digital divide and students being left behind in terms of skills needed for the 21st century labour market, have set the stage for increased private sector involvement in public education. This ultimately assists in the transfer of technology sector values and aims to the K-12 public education system.

4.4.1 Interrelationship between the state, industry, and civil society

When assessing the ways in which digital capitalism is present in education and specifically the P-TECH network, it is important to examine the interrelationship between the state, industry, and civil society. The theory of digital capitalism posits that corporate interests are the ones being served and that corporate control is growing, thus furthering the already asymmetric power relations between the state, industry, and civil society. The SNA findings support this, although the SNA alone is not enough to confirm or discredit this.

While P-TECH is officially recognised as a public-private partnership (PPP), the SNA illustrates how traditional lines and demarcations such as market and State, private and public, are actually blurred. For instance, Stanley Litow was the Deputy Chancellor of NYC Department of Education before going to IBM and Sam Palmisano served both as the CEO of IBM and on President Obama's cyber-security council. The SNA ultimately helped highlight the reciprocal ties between individuals from the technology sector, government, and public schools. It showed that corporate actors such as Stanley Litow and Sam Palmisano are closely connected to key decision-makers within the education system such as Joel Klein,

former mayor of New York Michael Bloomberg, and NYC Governor Andrew Cuomo. In addition to being lauded as an exemplar model of education by President Obama in his 2013 and 2014 State of the Union Addresses, since its inauguration, P-TECH has been on the cover of Time Magazine (Foroohar, 2014), in an article published by the New York Times (Baker, 2012) and featured in a PBS special (Shalby, 2014) all before having their first graduating class. The SNA results show how key actors such as Stanley Litow are at the most two degrees separated from high office officials such as President Obama or state officials like Governor Andrew Cuomo. As such, these interpersonal ties offer some explanation for the substantial praise and promotion prior to any sort of formal assessment of the model. The SNA alone does not provide the full explanation but unveiling these ties is illuminating and supports this logic.

The formation of strategic alliances is not new in any sector but the way technology is privileged in these relationships is one way in which the role of digital capitalism is apparent. Where education was once valued for creating an informed citizenry, it is now based on and shaped by ICT industry actors. The private sector has successfully framed public goods like education as areas in need of market influence. Indeed, it is still their views that are the ones being promulgated.

Schools, the state, and the private sector all benefit disproportionately in these relationships. The government is relieved of some of their financial responsibility by having states depend more on private sector resources for their schools. Schools receive these resources but at the cost of hyper-accountability measures placed on them and lack of control over their structure and pedagogy. Technology companies such as IBM benefit by gaining more influence and control over the education market through the likes of their own education models such as P-TECH, and through high-stakes testing, common core, and the technological resources the schools now need. These strategic alliances also allow

corporations to create more of a need for their supplemental educational resources outside of school.

While private companies and the state offer a narrative about the need for market-based reform in education, which is currently being predominantly led by large technology companies, the analysis shows that policy in this context is shaped not by market forces alone but by individual ties and influence. With no evidence to believe the model is effective, the continued praise and investment in the model can also be credited to the strategic alliances among individuals at the centre of the P-TECH network.

The interpretation of the SNA findings through the lens of digital capitalism was useful in providing insights regarding the shift in influence and control between the state, industry, and civil society within the K-12 system. It has already been pointed out that the corporate influence over P-TECH's structure, organisation, and curricula is distinct from other models. However, there are many models with unique structures in different ways that are implemented each year and do not enjoy the level of praise, publicity, or sustainment that P-TECH has. The argument behind digital capitalism in education posits that the education system is increasingly catering to the technology sector with growing participation from private actors. This is happening at the same time the government is relinquishing control and promoting more dependency on the private sector. These processes in conjunction with the SNA results demonstrates how P-TECH is a tool for industry in a way that other models are not. It helped to illuminate the entanglement between IBM and government, where many former IBM employees have been appointed to education advisory positions and at times, political positions. Most ICT-driven education models do not have this amount of control and influence behind them.

In order to answer this question fully, the qualitative components of the study must be considered. The proponents of applying market logic to public education are the ones supporting the policies and investments in schools like P-TECH. However, what this part of

the analysis has shown is that P-TECH's prominence is based on key interpersonal ties and the alignment of economic values between industry and the government and not on evidence to support it has achieved its aims or is a successful model yet.

4.5 Conclusion

What the SNA ultimately unveiled was the overall structure of the P-TECH network. From this, insights were gathered regarding which actors were responsible for shaping the network and how P-TECH garnered so much publicity and expanded so rapidly. It was primarily the Individuals x Individuals network that enabled these valuable insights. Key interpersonal ties between IBM, the education sector, and the state were illuminated. Without the SNA, the importance of SUNY to the P-TECH network would not have been discovered and this discovery led to important findings regarding the key actors in the network due to their connections to SUNY and Governor Cuomo. By being able to visualise the structure of the interpersonal ties, the extent of the revolving door between the state and technology sector would also not have been made so apparent. The SNA for this study lays the backdrop for the rest of the analysis and provided critical information that informed who I spoke with and what I asked. The findings from the SNA were ultimately confirmed through these discussions. Perhaps most importantly, the findings from the SNA also provided a way for a structural analysis of P-TECH that were analysed within the context of the contemporary corporate driven restructuring of the US K-12 system which highlighted how forces of digital capitalism are also at play.

As this chapter has demonstrated, the strength of SNA is mapping the structure of relations between actors in a network and exposing underlying connections that may not be evident on their own. However, SNA is limited in that it cannot capture the culture and agency components of these relationships and the network being analysed. In order to increase the value of this approach SNA should be supplemented with qualitative methods in order to strengthen the analysis and provide a more holistic understanding of the

phenomenon being studied. Without the qualitative data the role that some actors play in the network would have been inflated and others unnecessarily minimised. For instance, Cisco ranked as one of the highest on betweenness centrality, which again, is a proxy for control of the flow of information and overall influence in a network, when in reality Cisco is a relatively minor actor in the P-TECH model. IBM would have also been treated as a less influential actor in the network when it is actually playing a large role in shaping it because it is not doing so through *formal* partnerships. As such, while SNA offers a comprehensive visual of the connections within networks and provides a way to measure the prominence or influence in a network it is important to recognise that the different ways in which ties and nodes are specified influence these measures. For example, in the primary network the ties signify who is partnered with whom which does not capture other variables such as cultural influence or economic leverage. This is why SNA benefits from being supplemented with qualitative data.

Qualitative data complements the SNA in this study in multiple ways. One way is by confirming the key actors in the network and another is by giving more insight into the motives behind each partner's involvement and interest in the model, as well as the cultural implications. Another reason qualitative data, and a cultural perspective, are necessary for this study is because relying solely on a structural analysis often results in a story of control without seeing or acknowledging important variations in how the model and ICTs are being appropriated that can only be seen through the everyday. Structural analyses also often miss important resistance politics at play. All of this is necessary in order to fully understand the role of P-TECH in the K-12 system and its consequences at both macro- and micro-levels of analysis. The following three data chapters fulfil these needs.

Chapter 5 Kettler High School

Apple and Microsoft have dominated the education market for hardware and software for several decades now. Apple first entered the education market through its Apple 1 computer in 1976 and started to spread throughout California schools in the 1980s. Microsoft has been the biggest source of competition for Apple in education starting shortly after their entrance into the education market in the early 1980s. However, in just the last five years, Google has surpassed both to become the dominant technology resource in American schools. According to Google for Education, 20 million K-12 students use Chromebooks and G Suite now has 70 million user worldwide (Google for Education Team, 2017).

In an attempt to reestablish themselves as the education mainstay, Apple recently unveiled its newest iPad with the iPad pencil that was specifically designed with K-12 schools in mind (Nicas & Singer, 2018). Microsoft also recently unveiled a new affordable computer also designed for the classroom in order to compete with Google's Chromebook (Microsoft Education, 2018). Microsoft has also announced it will expand its Microsoft Office 365 for Education while they continue to promote their virtual reality headsets as a key educational tool. The continuous struggle between technology companies to gain and maintain dominance in America's schools is illustrative of the larger trend, discussed in chapter one, where major technology firms seek to revolutionise education.

It is understandable how the education market is particularly appealing for profit-oriented companies such as IBM, Microsoft, and Google, because the potential for profit is large in this sector. According to their quarterly results report, Apple enjoyed more than one billion dollars in profits from their education market-share just five years ago (Apple Financial Results, 2013). The reasons why these companies are motivated to implement their non-profit initiatives such as P-TECH or create free productivity platforms such as Google Classroom is examined less. As outlined in chapter two, there have been many studies that discredit the Corporate Social Responsibility (CSR) argument. What this indicates is that there is more

driving these initiatives in terms of company motivation than mere profit. As this chapter demonstrates, I argue that it has more to do with the fact that these technologies and initiatives operate within broader ideological systems which connects students and public schools to processes of commodification and the corporatisation of education.

It has already been established that technology companies such as IBM, Google, Cisco, and Microsoft have an extensive history in education. However, they are now occupying an increasingly central role in the current corporate reform movement as educational technology continues to be fervently embraced (Selwyn & Facer, 2013; Roberts-Mahoney, Means and Garrison, 2016). While certain areas of corporate influence in education are gaining more attention from researchers, the political economy of ICT-centred companies in US public K-12 education remains relatively untouched. Also overlooked in the available scholarship is the role this is having in terms of school culture and identity. Kettler High School, the first site of this embedded case study, exemplifies the ways in which the corporatisation of education, with the technology sector in the centre, can influence the aims, values, and interests of public education to match its own, while also affecting students' identities and aspirations. It helps to provide insight into IBM's role in this through their P-TECH model, which continues to advance cultural belief in the power of technology to be a democratising force bringing about equity and opportunity. Through examples from Kettler, I argue for the importance of educators and partners having a critical lens toward and supporting deeper engagement with race, gender, and class if the P-TECH model is to maintain its mission and achieve its aims. Overall, Kettler High School demonstrates the potential benefits and costs of P-TECH through the amplification of business-oriented language and logic overtaking school culture, whose interests and values are being served and how this may be shaping students' identities and future aspirations.

5.1 Why Kettler? Political Economic Geography

In many ways, the location of Kettler including the city and state it is situated in is unremarkable. It could be mistaken for just about anywhere in the country. Unlike these other locations, it is not immediately obvious why Kettler would implement the P-TECH model. There were no strong ties uncovered through the SNA, it is not located in New York, there is not a booming technology industry and as far as I found there were no plans to become one.

I then looked to see if perhaps the city stood out in terms of inequality which provided valuable insight. I found that the state where Kettler is located has one of the most striking socioeconomic gaps in the country. The state's Gini Index[2], which is used as a measure of inequality, is the highest in New England, meaning it is considered to be the most unequal in the region (Statistical Atlas, 2015). Beyond the local region, the county where Kettler is located has one of the highest Gini Indexes in the country and the highest in the state. The city is also the state's most ethnically diverse city and one of the nation's most diverse cities as well (McCann, 2018).

The state where Kettler is located was hit particularly hard by the recession in terms of job loss. It ranks near the bottom for states in the US to recover jobs lost during the recession (Bureau of Economic Analysis, 2017). However, the city where Kettler is located ranks as the best in the state, having recovered and gained more jobs than were lost during the recession (Bosak, 2017). Much like its population, the city's economy is incredibly diverse, and it should be noted that technology is not part of it. Understanding why this high school chose to implement the P-TECH model with an IT focus despite not having a strong technology sector becomes clearer when assessing the city's interests and values stemming from its political context. I argue that the reason for the region's economic resilience and performance is its diverse economy and its successful industrial past where they built an infrastructure compatible with many different businesses in mind and one of the first

[2] For a Gini Index of zero the geography in question would be perfectly egalitarian in the distribution of income whereas a Gini Index of one would mean that all of the wealth is owned by one person. As such, the closer to zero a city's Gini Index is the more egalitarian it would be.

economic development programs. However, the region's president of the chamber of commerce credits the city's economic performance and recovery from the recession to the city's mayor and local government officials who are "pro-business" (Bosak, 2017). On the city's website they tout their "pro-business climate" and state that it is ranked the best city in the state to start a business. There are many resources and policies in place catering to businesses such as offering competitive tax credits to local businesses and rejecting increased business taxes when the state's Department of Labor proposed a business payroll tax (Business and Industry Association, 2018). While it can be argued that all cities are interested in building their economies, this city stands out in the way it has crafted its policies to attract and serve businesses where other cities balance this interest by prioritising public services and goods. In this way, the priorities, interests, and values of the city's government directly aligns with those of P-TECH and the current corporate reform movement overall. As such, once understanding the political economic landscape of its location, it becomes clearer as to why Kettler would establish a P-TECH program.

5.2 Site Profile

In most ways, Kettler's P-TECH program mirrors what the model set out to look like. It is primarily meant to serve low-income and underrepresented youth by equipping them with the relevant "middle-skills" needed for the IT labour market. The P-TECH program at Kettler was finishing its second year and had 185 students between the ninth and tenth grades during my time there. While many of the students in the P-TECH program were performing below grade-level like most of the P-TECH programs, their pass rates mirrored the general student population at Kettler High School.

Kettler's P-TECH program represents P-TECH's "within-school model" meaning it is a separate program implemented in an existing high school. Much like the city being unremarkable in many ways, Kettler High School looks like any typical American high school at first glance. However, walking up to the main building on my first day I was

immediately struck by the large security presence. There were multiple security guards in police uniforms patrolling the entrance to the school and each of the hallways. Each morning I would check in and hand my driver's license to the security guard through the bulletproof glass and receive my visitor badge then head downstairs to check in with Ms Hernandez, the P-TECH director, at her office before classes started.

Once entering I noticed how large the school actually was. It is the largest high school in the state, serving over 3,000 students. It is made up of multiple large buildings with three floors in each. It is an unusually diverse school, especially in a city with less than 90,000 people. The high school has 38 languages spoken across the student population. The limited categories to choose from on their demographics reports do not accurately represent the diversity of Kettler High School. The data shows there are 1,200 Hispanic students, 300 Black students, 1,200 White students, and 200 Asian students. What this fails to show is that many of these students are Brazilian, Portuguese, Dominican, and Jamaican. This is important to note because there were significant clashes between racial and ethnic groups that informs the culture of the school and affects the P-TECH program.

5.2.1 Demographics: class and racial tensions

On my first day at Kettler I sat in Ms Hernandez's office while she was explaining to two students why they were going to be suspended after getting into a physical altercation. When the students left for the principal's office she told me about the tensions between races and ethnic groups and how these two students were from "opposing cultures". During my time at Kettler I stayed with a local family whose daughter was a senior at the high school and we discussed these tensions during dinner as I tried to make sense of them. She explained to me that the Dominican and Jamaican students did not get along with one another and that the Portuguese and Brazilian students have issues with each other. She told me that the racial tensions at the school were a dominant feature of her high school experience.

Kettler's P-TECH program mirrored most P-TECH schools in that it was predominantly male and a majority of the students qualified for free or reduced lunches signifying they came from lower income households. Despite the school being diverse overall, the concentration of underrepresented and low-income students in the P-TECH program was high compared to the school on the whole. In several interviews, students made remarks about this being one defining characteristic of the program. Melissa, a 10th grade student who is recognised as an overachiever, ranked as the top student, and comes from an affluent household, pointed out in her interview that she is "one of just a couple of white students in P-TECH" and said her parents were not enthusiastic about the "type" of students the program draws. While discussing other students' motivations for choosing the P-TECH program, Melissa stated, "a lot of people joined because it is a free college education, so it is more lower income". A 9th grade student, Isaiah, said he was hesitant to join P-TECH because he "felt that it's going to attract kids who want to go into the workforce right away. You know, kids who *have* to go into the workforce right away."

The socioeconomic and racial divisions at Kettler were indeed very pronounced. The tensions pervaded the classrooms and culture of the school. These tensions were heightened as the city's mayor gained national attention by his call to city officials to cooperate with the current administration's federal initiatives to seek and detain undocumented immigrants in the city. During my time at Kettler, there were a series of hate crimes targeted toward undocumented students and students of colour. One major incident while I was at the school encapsulates this well. The students organised the largest student walkout that was nationally televised, protesting what they felt was a lack of support for students of colour by the school's educators and administrators. This was in response to an incident where the father of a white affluent student at the school had their driver circle the parking lot after school one day while he shouted out of the car, "Trump is sending you all back to where you belong!" The students were upset that the security guards and administrators were not taking action

after a group of them had asked. The incident ended with the students physically assaulting the man and the students being arrested. The students felt that it was unfair the man faced no repercussions, which inspired the walkout.

Following the walkout, the P-TECH teachers in each of the classes I observed that day asked who participated and discouraged the behaviour by diminishing the value of protests. Most of the students were silent. By this point in time, based on several instances in various classes, it had already become clear to me that the teachers discouraged critical discussions around race, class, and gender. There was significant emphasis placed on business-etiquette and teachers continually expressing that they must remain value-free and apolitical. This idea of a value-free business environment pervaded the program's organisational structure.

5.2.2 Organisational challenges and private sector influence

The worldview informing the culture of Kettler's P-TECH program is embedded in its organisational structure in terms of whose values and interests are being served through the partnership. While the concept of public private partnerships denotes a shared voice, I found that there is still an imbalance regarding whose voice is heard and interests are served. In the context of Kettler's P-TECH program it is the private sector's values and interests being espoused over those traditionally linked to public education. Where education has been historically valued as a collective human endeavour the rise of private influence has influenced the shift toward a more utilitarian and economically-centred education system. As discussed throughout this thesis thus far, the values and purpose of education are being replaced with an instrumental and vocationally-driven focus that caters to the labour market. In this case, the technology sector. I argue that the public private partnership structure here is a way to occlude the subtler forms of influence and control technology companies are gaining in education. This was illuminated when assessing the partnership roles and aims at Kettler.

More so than any other school I observed, Kettler's P-TECH partners were the most involved. Kettler's P-TECH program partnership comprises of the local school district, local

community college, and two industry partners. One industry partner is a large global technology company and the other is a financial technology solutions and management firm. Although IBM is not listed as a formal partner of the school's P-TECH program, they are still involved and present in various ways. Each industry partner provides mentors for the students and helps author the program's curriculum based on industry needs. IBM has helped by supplying some of their own employees as mentors, offering potential internship opportunities, and having employees give guest lectures in their classes throughout the year. Ms Hernandez also maintains close communication with other IBM P-TECH liaisons that she reaches out to for advice on unsuspected challenges. Kettler's P-TECH program faced significant challenges with funding and lack of cooperation from their college partners.

5.2.3 Fiscal starvation and the sustainability of P-TECH beyond New York City

As the next chapter will demonstrate, a fundamental difference between a place like Kettler and the schools in New York City is that there is not the same level of financial or institutional support in non-metropolitan areas. As the US Department of Education (DOE) continues to see the most drastic cuts to its funding since the Reagan administration, public schools are being starved of resources, which will further the narrative that the public school system is inherently flawed and failing. The most recent fiscal proposal shows the DOE will endure a 3.8 billion dollar cut to its budget with 1 billion in new money dedicated to private school initiatives (White House, 2018). As such, federal aid for public schools will continue to diminish and further states' and districts' dependence on local and private funds for resources. The governor in the state where Kettler is located issued a nearly 60 million dollar cut to the state's education budget (Office of Policy and Management, 2017). While the schools impacted the most by these cuts were those with a concentration of students from higher income households, all schools throughout the state have been affected to some degree and are facing similar pressures to find alternative forms of funding. As such, funding was a pronounced challenge threatening the sustainability of Kettler's P-TECH program.

During my first week at Kettler I attended two planning meetings. One was the budgeting and finance meeting with district officials and the other was a scopes and sequence planning meeting between Ms Hernandez and the community college partners. At the first meeting I was given a breakdown of the annual costs to run the P-TECH program. The program costs over 250,000 dollars per year. Included in this are the college courses, transportation to and from the community college, textbooks, mentor meet and greets, and Ms Hernandez's salary. The primary source of funding for the program, like most P-TECH schools, comes from grants. In addition to Ms Hernandez, there is a person at the district level whose job is to seek and secure grants for the school, including the P-TECH program. The issue with this is that most of the grants are not automatically renewed each year which brings about much uncertainty to the sustainability of the program. This challenge loomed over Ms Hernandez and was acknowledged by each educator I spoke with.

The largest expenditure listed was for college courses. Each course costs 6,000 dollars unless there was a qualified teacher at the high school to teach it. In those cases, the school would only need to pay an administration fee and a curriculum planning fee. In order for a teacher to be considered qualified they need to hold a master's degree in the specific subject area of the course they were going to teach.

One way Ms Hernandez came up with the funds for the college courses was by having the P-TECH students fill out their Free Application for Federal Student Aid (FAFSA). There were several issues with doing this. Not all of the students in the program could fill the FAFSA out because there was a sizeable population of undocumented students who do not have social security numbers and thus not eligible for federal aid from the FAFSA. Because a majority of the students are low-income, they qualify for Pell Funds that can be used for their tuition and this is how a portion of the cost for college courses was covered. This is also problematic and runs in opposition to the foundational mission of P-TECH for a few reasons. For one, this no longer makes the associate's degree free because these funds are finite. If

these students use all of their Pell Funds and choose to transfer to a four-year institution they will have less financial resources and will likely resort to loans. Another reason this is problematic is because the intention was for these funds to be used to cover the 6,000 dollars per course cost and because there were many students that did not qualify for financial aid, either because they were undocumented citizens, or their parents made too much money, it means that the low-income students were essentially bearing the entire cost through their Pell Grants. This is particularly problematic when realizing that those affluent white students in the program are reaping all of the benefits at the expense of the low-income students P-TECH is meant to serve. It is important to note that this was not happening in New York City nor in the other schools I visited because they had the financial infrastructure and institutional support for their P-TECH programs. However, this does signal the need for more support throughout the country as the model continues to expand. It also signifies the threat to the sustainability of P-TECH without that same support network that districts in major metropolitan areas have.

Compounding the existing funding challenge was the fact that the college partners would not cooperate in the partnership. Having attended the planning meeting and sitting in on multiple calls with the college liaison, it was evident that the relationship between the school and community college was troublesome. As demonstrated in the following chapter, college partners are meant to work closely with the P-TECH directors to plan the sequence of courses for the P-TECH students and help embed them in the college community. There were concerns that Kettler's P-TECH students were treated as commuter students and did not have access to the resources on campus like other P-TECH students in New York City had. The underlying issue came from the fact that the community college partners focused on merely providing a limited service instead of viewing itself as part of a partnership.

In many cases, the college partners at other P-TECH schools worked with the high schools on ways they could save money and ensured that the P-TECH students had access to

tutoring facilities and the library. Ms Hernandez explained how she went straight to the professors and asked how necessary it was to buy each student the costly textbooks for their course. Ms Hernandez said in most cases they told her buying a handful of textbooks to share in the class would suffice. The college liaison raised issues with this. In Kettler's P-TECH partnership memorandum of understanding (MOU), it states that the community college is responsible for staffing, providing access to the campus buildings, and "agrees to limit costs associated with facilities access for P-TECH students". It also states that any costs, if any, must be pre-approved by Kettler or the private partners respectively. Finally, the MOU states that each partner "acknowledges that this collaboration is a voluntary, community-minded, good-faith initiative, giving rise to no binding or enforceable contractual obligation" meaning there is no proper recourse for not adhering to the agreement. In all, there was nothing different the community college partner was offering the P-TECH program that was not already available to high school students taking college credits and they were not offering the same flexibility in costs that other P-TECH community college partners offered at the other schools. Despite this, the college partner promotes their partnership with the P-TECH program on their website as an example of their dedication and service to the community. The ways in which partners view the P-TECH partnership has significant implications for how well the model operates.

5.2.4 Curriculum goals and development

As stated above, Kettler's P-TECH program represents the original conception of the model in that it primarily serves marginalised students and trains them for technology sector jobs while earning an associate's degree at no cost to the families. Kettler P-TECH students can earn their degrees in Computer Information Systems with a focus on programming and database design or Business Administration with a focus on computer applications. In my interview with the lead P-TECH teacher at Kettler, Mr Hopkins, he explained that Kettler is a Title I school and that the federal regulations on curriculum for Title I schools are much

tighter than those not receiving that aid. He said he appreciates how P-TECH allows them to include flexibility in the P-TECH curriculum. He explained it this way:

> Districts struggling financially are closely tied and closely regulated in terms of curriculum for core content areas like English and so those things are generally very strictly watched by members at state and federal levels. [But] with Workplace Learning for instance, it gives us a little bit of freedom to try new things.

The "new things" Mr Hopkins discusses entails inviting IBM and other private partners to come speak to the students or spending extra time on topics of particular interest to the students that relate to business or computing. While it is conceivably helpful and productive to have more engagement with industry representatives in this way, this flexibility could also offer important opportunities to engage in meaningful discussions covering topics such as equity and social justice. As the chapter will demonstrate, this flexibility has instead become an entry point through P-TECH to further entrench corporate values and norms. Aligning with this, the curriculum was based on industry needs outlined by the private partners.

5.3 IT industry and the graduate skills gap

As discussed in chapter two, digital capitalism has helped to propel technology companies' involvement in education primarily through providing resources and services such as supplemental education resources, data management services, and online programs. Regardless of the specific resource or service technology companies have provided to further their reach in education, each has been based upon the construction of a need or problem where technology companies have successfully framed the solutions as technical. The most prominent example of this is through digital divide policy discourses. In the earlier dichotomous "haves" versus "have-nots" conception of the digital divide, the solution was to provide more access to technological resources, and still, with more contemporary understandings which acknowledge the multifaceted nature of digital inequalities the answers proposed by technology companies still result in more technology. As popular understandings of the digital divide continue to mature, more attention has been paid to the

socioeconomic inequities that are at the heart of the divide. Instead of addressing the underlying issues responsible for persistent socioeconomic inequalities, technology continues to be heralded as an equaliser that offers the opportunity for social mobility for whomever acquires technical skills.

Given the range of problems in society that technology is purported to solve it is unsurprising that it is also promoted as a pathway to prosperity. It is this very idea, that technology, technological skills, and the technology sector equate to prosperity, that the P-TECH model is founded upon. Promoting the P-TECH model as a ticket to the middle class by equipping students with the technical skillsets that will make them competitive in the labour market establishes a need that technology companies are once again called upon to fulfill. Inherent in this pathway to prosperity rhetoric is the belief that the needs of the economy, or these partners, are parallel to the needs of the students. This logic is partly responsible for the continued vocationalisation of education observed in the current corporate-reform movement and warrants further assessment.

As stated above, Kettler's P-TECH partners were the most involved in the structure and organisation of the program at the school. As part of their involvement entailed co-authoring the curriculum, the partners would map what technological skills the students needed to learn to help ensure that they could successfully enter the workforce directly after graduating. The Digital Arts professor told me he was given some freedom in terms of what he taught but he had to make sure the students learned specific skills that were outlined by one of their private partners. As noted above, the Workplace Learning teachers also expressed that they appreciated having more freedom in developing the curriculum for their Workplace Learning classes because they are tightly regulated for other courses due to the school receiving federal funding for low-income students. Despite having more freedom to teach what they think is most important in these classes, the curriculum is still primarily shaped by the private partners.

In my interview with Mali, one of IBM's education program managers overseeing P-TECH, I was told that the skills needed were middle-skill jobs. She explained that these are jobs that require training beyond high school but do not require a four-year degree. The demand for these middle-skill jobs is purported to be high but a lack of a specifically skilled workforce with these middle-skills is hindering companies' ability to fulfil them (Burrowes et al., 2015). A report from the Harvard Business School explains that leaving these middle-skill jobs unfilled threatens the country's global economic standing (Burrowes et al., 2015). Many of these middle-skill jobs are found in the IT sector, which is understandable given how well-defined computing skills tend to be and the enthusiasm surrounding the technology industry. As such, the curriculum for Kettler's P-TECH program is designed accordingly.

While this notion of middle-skill jobs and IBM is discussed more in-depth in chapters 7 and 8, an important point to be made is that this emphasis on middle-skills is one way in which IBM has established a need for their P-TECH model. The appeal of P-TECH is made stronger through IBM's promotion and emphasis on the need to fulfill these middle-skill jobs. All of this reflects the vocational view and value of education that is a prominent critique and consequence of the corporate reform movement. Proponents of corporate reform and vocationalisation of education perceive this as mutually beneficial, which helps to explain another way in which P-TECH has had success in its rapid expansion. Framing the model as being mutually beneficial was a prominent theme found across interviews with students, educators, and private partners.

In their responses to the question of what they believed the biggest benefit of the model is, many students stated it was the free associate's degree and gaining the skills the private partners look for in their employees. They framed the benefits as a "win-win" where they acquire the necessary skills to obtain jobs and the employers get employees "designed for them" to meet their company's needs. Joshua, a 9th grade student stated, "The way I see it is that they tell us what they want from us, you know, what they're looking for and we give it to

them so they get what they want and we get what we want". Mali (IBM) summed up the goals of P-TECH and the mutually beneficial relationship this way:

> This is a talent pipeline for us. Technology (STEM) is not diverse then if you get into IT it's even less diverse overall these are not diverse fields in terms of gender or color so IBM is not any different so if you look at the students we've hired so far every single person is a person of color. It's certainly a talent pipeline for industry. It's certainly a way to diversify our talent pool.

Mr Hopkins presented the benefit as more one-sided but his response connects to Mali's point about opportunities and underrepresentation. He stated:

> I love that we are giving our students an opportunity to be trained in a job field that is becoming a more of a demand in our nation and it's something that our students from our district that I think can sometimes fall through the cracks in terms of their opportunities. So, I think presenting them with that opportunity early on and the fact that some of them will even end up with jobs is a powerful thing.

These quotes illustrate how the P-TECH model is framed as mutually beneficial because employers are gaining access to future employees tailored to meet their expressed needs and students are gaining opportunities to jobs and opportunity to achieve social mobility. What is missing from this framing are all of the various ways the private partners benefit beyond gaining a specifically tailored workforce. Some of the ways were outlined in the introduction of this chapter and others are detailed further below. The key point here is how the benefits are asymmetric where industry has the most to gain. Relatedly, one of the central arguments from this study made in chapter eight is how these translate to more economic and political power for IBM.

5.3.1 Mismatch between valuation of skills and hiring practices

The idea of equipping students with middle-skills has consequences in terms of social reproduction. Despite IBM's promotion of middle skills and belief that people do not need a four-year degree to excel in the IT labour market, educational credentials are still a powerful mechanism of social reproduction in advanced capitalist societies (Bourdieu & Passeron, 1990; Sullivan, 2001). Traditionally there have been two dominant paths to acquiring marketable skills, which has recently changed. For much of the twentieth century, one of the

dominant paths to obtaining the necessary skills for jobs was on the job enabled by career ladders and employees would be promoted from within. With the weakening of unions and decreased demand for many entry-level positions, as well as the high cost of apprenticeships there has been less internal support for employees to learn the skills needed to be promoted through apprenticeship programs (Fadulu, 2017)[3]. This has increased the valuation and dependency on the other dominant path to acquiring marketable skillsets, which is through higher education credentials. As such, while it could be the case that P-TECH students may be positioned to make more than their parents or by obtaining middle-skill, technology sector employment they are being primed for, the opportunities to move beyond these middle-skilled positions may still be limited.

This is further supported when looking at the responses from Kettler's P-TECH partners when I asked how competitive the students would be with an associate's degree rather than a four-year degree. Aaron, a mentor and private partner that sat on the steering committee for Kettler's P-TECH program encapsulates this in his response by stating: "Well it's certainly enough to get their foot in the door and make decent money. Then they can always get more credentials after the fact."

Many felt that college degrees were over-valued in society and not worth the investment. Several partners justified this position by stating that the skills gap was due to an out of touch academic elite teaching irrelevant and out of date skills to their students. Chris, one of the industry partner representatives, told me that they determined which skills were necessary based on the ones their new hires out of college were missing. He explained:

> We get all of these freshly graduated young people who wasted so much time and money learning things they will never need. I would say a quarter of the skills they learn in today's standard computer science program is what they end up using.

[3] Anthony Carnevale, a professor and director of the Georgetown University Center on Education and the Workforce explained that the high cost of apprenticeships deters employers from providing those opportunities (Fadulu, 2017).

The responses illuminated a disconnect between employers' stated views regarding the valuation of skills over traditional hiring filters such as college degrees and actual hiring practices. Despite being vocal about their views that four-year degrees are over-valued in society and not worth pursuing, the partners said the students would only be eligible for a certain level of jobs with them without having at least a Bachelor's degree. When I asked about what jobs the early graduates from the original P-TECH had obtained, Mali from IBM stated, "we have students working on our marketing team, we have them in our digital business group, we have them in customer relationship and we have them in communication." One of the first characteristics about these jobs to notice is that they are not highly technical positions. Perhaps P-TECH graduates will migrate into more technical positions but it currently represents a mismatch in the promises of the model, students' aspirations based upon this, and the jobs actually acquired. However, longitudinal data is needed in order to speculate further on the implications of this mismatch but it does warrant attention as more students graduate from P-TECH programs.

When considering the responses from the private partners about needing a four-year degree and the jobs currently held by the early P-TECH graduates, students may be able to find middle-skill employment, the opportunities for growth and prospects in moving beyond those will still be limited without a four-year degree. The value of having the opportunity for middle-skill employment should not be overlooked or understated. However, many students are drawn to P-TECH based on the "pipeline to prosperity" and "ticket to the middle-class" rhetoric that is used to garner more attention and appeal for the model therefore it is important to be clear by outlining the limits of those opportunities. If IBM and these private partners are committed to providing multiple pathways to secure and lucrative employment without having a four-year degree then more will need to be done. Without providing other opportunities for growth, the promotion of middle-skill labour for these students risks

guiding students into middle-skill employment with a ceiling on opportunities prohibiting social mobility.

Finally, partners also often expressed frustration with their recently graduated employees saying that they have developed bad habits and one of the advantages of attracting students from a young age like they do through P-TECH is that they can ensure they can intervene before any "bad habits" are developed and they can save time on training. The following quote from my interview with Larissa, one of IBM's professional leadership training facilitators and curriculum developers, exemplifies the common sentiment across partners and denotes these habits as "baggage":

> We're training you the way we need you to be, you bring with us no baggage and great ideas. We're going to show you how to do things right. So that's the big advantage. You're coming with no baggage and we're going to make an investment in you and you're going to stay with us for a long time so we can kind of show you up to the top.

There are many facets of the quote warranting attention but one point to make that connects to larger consequences of P-TECH is how they view students as labourers to be moulded according to their norms and aims. In addition to the specific technology skills, the partners often expressed the need for graduates to acquire "soft skills" which were privileged over the technology skills. While there were variations in what was considered to be "soft skills" they most often referred to adaptability, communication, open-mindedness, and interpersonal skills. It is through these two themes, the moulding of labourers according to the partners' values and aims along with the emphasis placed on soft skills that illuminates an important consequence of the P-TECH model. This is discussed below in the context of the interrelationship between identity, aspirations, and IT.

5.4 IBM MentorPlace

Mentorship is one of the primary components of the P-TECH model regardless of where it is implemented. However, the forms it takes does vary. At Kettler, each student is paired with a mentor and the role of the mentor is to provide guidance to the student that will better

prepare them for the workforce. Mentors at most P-TECH schools are employees from the school's specific industry partners. Due to the shortage of employee volunteers from Kettler's private partners, mentors for Kettler's students also came from IBM and community volunteers that were employees at various companies. Regardless of where the mentors come from the objective with the P-TECH model's mentorship program is the same. In my interview with Mali (IBM), she explained:

> The purpose of the mentorship is really to give them an insight into IBM and to have career coaching throughout their time. Based on the communities that we place P-TECH in they still don't necessarily have professional role models at home in the sense that they don't work in an environment like IBM and so they don't have a lot of ways to learn what business etiquette is.

This quote illustrates the recognition of the importance of cultural capital and how increasing students' cultural capital is built into the P-TECH model. As a reminder from chapter two, cultural capital represents a collection of social and symbolic assets including tastes, preferences, mannerisms, and material belongings that are embodied and can be used as resources that promote social mobility (Bourdieu,1979). As demonstrated here, one way the P-TECH model improves students' cultural capital is through mentoring. It is important to be cautious and critical of how this transferring of specific values and assets are also working to reproduce hegemonic ideals intricately tied to social class. As the next section will discuss, institutional habitus is a central mechanism through which these values are being reproduced and embodied by the students in Kettler's P-TECH program.

Kettler's P-TECH program, like many P-TECH schools, utilised IBM's MentorPlace to facilitate the mentoring component of the program. MentorPlace is an online program that connects IBM employees with students in order to provide academic and career guidance. On IBM's website they tout the program as enabling "a real-world framework to support employee volunteerism, and connects IBM mentors to students using online activities that correspond directly to classroom lessons" (IBM Corporate Citizenship, 2010). Stanley Litow is quoted on the website stating, "IBM MentorPlace is an opportunity to expand our

commitment to education even further." He continues with, "By using innovative technology, e-mentoring is a perfect fit for our busy employees who truly have so much of value to share with children." (IBM Corporate Citizenship, 2010). MentorPlace is a force of centralisation and represents how IBM can create a need for its proprietary product by embedding it within the P-TECH model. The economic power held by IBM is taken for granted without questioning or perhaps even recognising the kind of influence the company has through the use of its product. The same argument can be made for the widespread adoption of Google Classroom across the country. What these companies are doing by establishing dominance in schools is more than increasing profit. Google, Apple, Microsoft, and IBM through P-TECH use their services and resources to groom loyal consumers but they are also advancing an ideology through their products. Resources such as Google Docs in the class are training students to value skills such as teamwork by designing the application to serve collaborative projects.

By placing the technology sector at the centre in a political economy analysis of the current shifts taking hold of education it becomes clear how Google classroom and IBM's MentorPlace are further propelling the current philosophical shift of education from that of valuing an informed citizenry to skilled labourers. In all, MentorPlace represents another way IBM is furthering its reach in education and embedding itself in schools and commodifying its users. It is seen as a one-way contribution from IBM to schools but it is also a way to infuse IBM values, logic, and practices in schools and students at an earlier age.

A common criticism of the mentoring was that it was almost exclusively online. A majority of the correspondence between the mentors and students takes place through MentorPlace. Two of the IBM employees I interviewed defended the use of primarily online mentoring by saying that is how the world works now. For instance, Larissa exclaimed:

> That's reality. That is the world of IBM. I have an IBM team that I will never meet and we have projects to do, we have meetings to go to electronically, we converse only in email and instant messenger and we work on projects and we get things

> done. So these students, not only are they improving their network, rapport, I mean from a business perspective using that as a business tool is extremely powerful.

During my time at Kettler, the director of their P-TECH program registered me as a mentor on MentorPlace so I was able to see the capabilities of the platform, activities, and be informed on the mentor news. In the profile for the mentors they are given space to fill in: their biography, career title, salary range for their career, description of what they do in a typical day, description of their work environment, and a section to provide general career advice based on their experience. Figure 5.1 below is a screenshot of my mentor dashboard and what is shown when a mentor signs into MentorPlace.

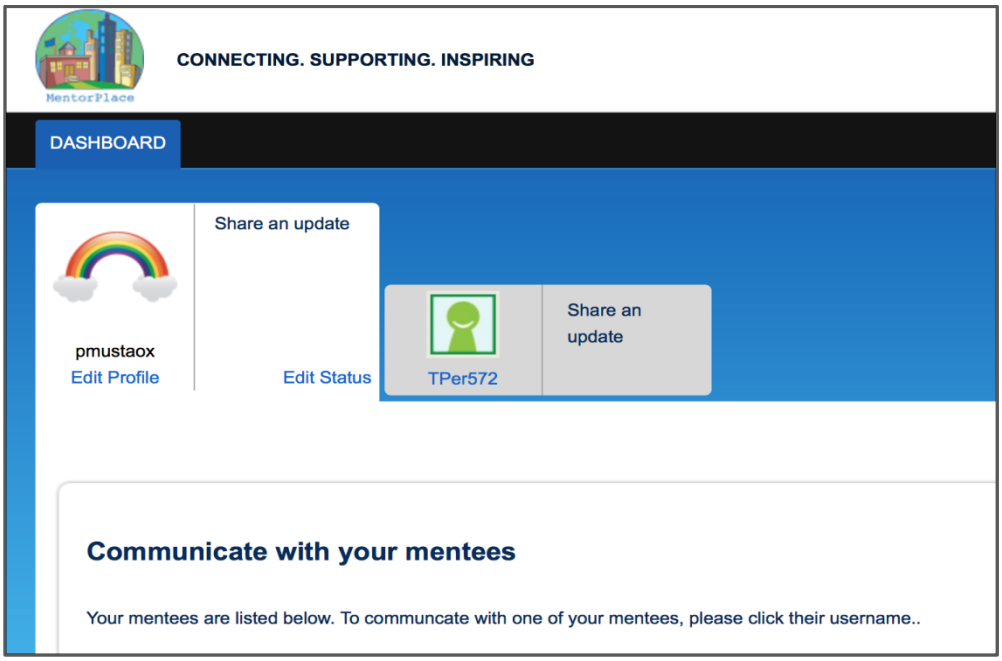


Figure 5.1 The mentor home profile page on IBM's MentorPlace.

Mentors are encouraged to celebrate the contributions made by students by sending them a reward. Figure 5.2 shows the awards available and highlights what is valued such as ‘effective communication’ and ‘innovative thinking’.

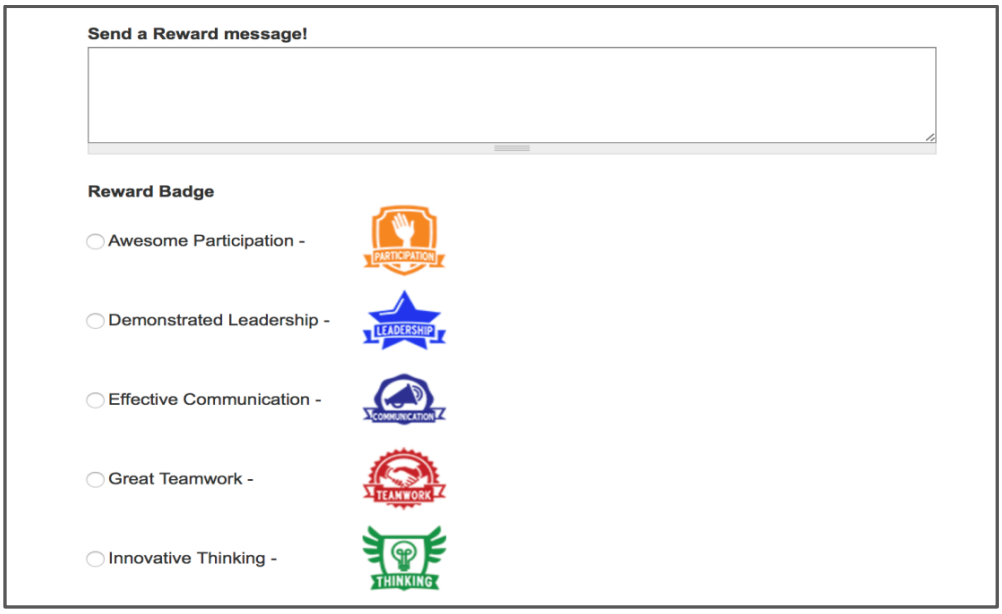


Figure 5.2 Awards available for mentors to give P-TECH students through MentorPlace.

In their Business and Workplace Learning classes, students are given time to respond to specific prompts that were created by the industry partners and sometimes the teachers. These typically coincided with what the topic being covered in class was. Some of the topics covered include: proactive learning, long-term vision and planning, overcoming adversity, listening vs. hearing, strategic communication, the art of argumentation, willingness to try new roles, open-mindedness and your biases, diversity, shared responsibility, group dynamics, leadership, and collective brain power. I was particularly interested in looking at the activities focusing on diversity, adversity, and biases, as these are fundamental components of P-TECH. Figure 5.3 is an example of one of the activities the students worked on in class during my time at Kettler.

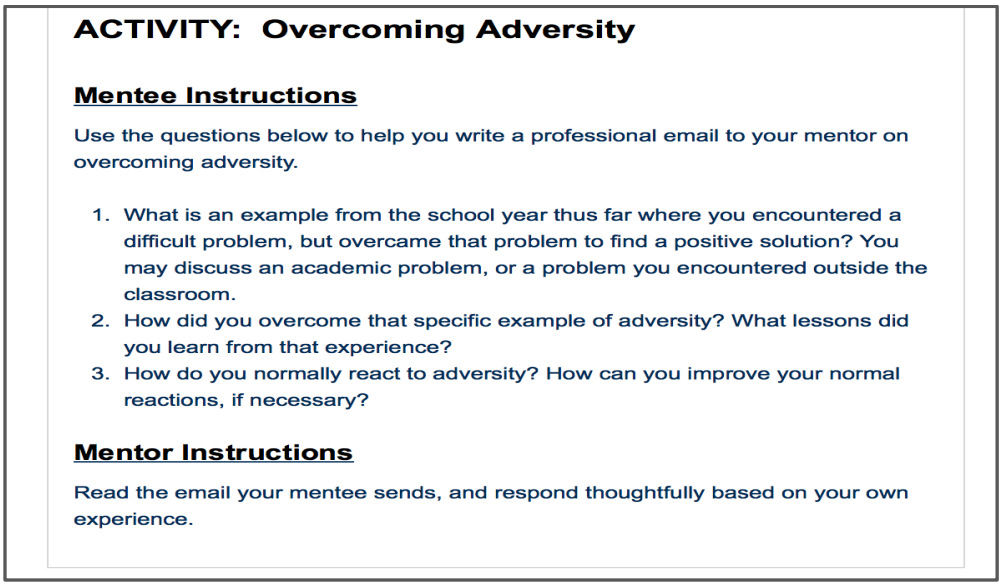


Figure 5.3 Sample activity for students to respond to on MentorPlace.

After observing the hesitation from educators to engage deeply with potentially sensitive topics such as race, class, and gender, it was unsurprising to find that responses from other mentors, the students, and educators' reactions when students shared their work were generally apolitical and tempered. The students took note of this as evidenced by Stephan, a 10th grade student, when he told me:

> I get it. Teachers aren't supposed to be political and you have to be PC in business if you're going to make it but it's just weird that they'll bring up these topics like diversity or hardships or whatever then shut us down if we talk about racism.

Ms Carpenter, the 10th grade Business teacher, told me that there is a cultural sensitivity issue among students and that it would get inappropriate and controversial. This was used as the justification for why they are not able to discuss topics such as diversity more in-depth. However, it was clear that the educators would benefit from a critical cultural training session as well and this is something that IBM should implement as part of the P-TECH model if they want it to be effective in achieving its aims. Because most of the educators are predominantly white and come from middle class backgrounds, there was a significant level of disengagement and understanding of what particular struggles the P-TECH students face. At Kettler, this signifies the lack of awareness and engagement with the students the P-TECH program seeks to serve.

Although it is important to recognise that the involvement of individuals is motivated by a genuine concern for equity and desire to help students succeed it is also important to interrogate what is considered success and the values embedded in this conception. Also, it is important to acknowledge that IBM is a profit-oriented company and the goals of corporations often clash with those of education. The topics of the prompts and the responses demonstrates how companies are co-opting the language of social justice which is an opportunity in education to expand understanding and discuss societal ills that directly affect these students but the lack of deeper engagement and the censorship taking place in order to remain apolitical and "value-free" as they promote business to be signifies this clash clearly.

5.5 Tech sector influence on school culture and students' identity

The P-TECH model, within the context of the current corporate reform movement, challenges and shapes students' existing identities in meaningful ways. Once again, identity here is conceptualised as a continuous process built upon by various social constructions. It is fluid, relational, and embedded within relations of power (Hall, 1990). Indeed, identity is a process of constant negotiation discursively produced against or aligning with dominant identity discourses. It is important to examine and understand the ways in which P-TECH challenges and shapes students' in terms of their identities and aspirations in order to fully grasp the potential consequences of the model at both the macro- and micro-levels.

As is the case in each school, Kettler's P-TECH program's culture is a dominant influence on how students think about or understand what they are doing and how they think about themselves in this context. As established throughout this chapter, the culture of Kettler's P-TECH program is constructed through the fetishising of technology, emphasis on business logic and behaviour, and a perception of being apolitical that is permeated by an uncritical gaze toward issues of race, class, and gender.

5.5.1 Producing corporate subjects

The way in which the technological artefacts used throughout the P-TECH classes are contributing to the culture and values of the P-TECH program and in turn influencing students' identities is important, but it is secondary to the impact from the more socio-cultural context surrounding P-TECH's emphasis on how to act in the business world. Larissa (IBM), whose role is to provide leadership training to IBM employees, responded to my question about the greatest benefit of P-TECH by saying, "They're going to learn the tech skills either way but they will not learn how to behave in a business setting". In her presentation to the 10th grade workplace learning class, Larissa exclaimed, "we are training you the way we need you to be". The students are being acculturated into a norm of corporate behaviours and values. This again signifies the importance of cultural capital and the reproduction of hegemonic values that are being normalised and internalised at P-TECH. Indeed, the P-TECH program at Kettler is conditioning and constructing its students into corporate subjects.

One mechanism for helping students internalise these values and norms employed by the educators was by frequently presenting hypothetical scenarios for the students to respond to using IBM as the company example. For instance, Mr Nelson, another Workplace Learning and History teacher, would call on a student who was talking over him and say, "what would your boss at IBM say if you were acting like this at work while he was giving a presentation?" Students were frequently called upon in this way regarding their posture, lack of eye-contact, and not contributing to a discussion. Beyond being used as a mechanism of control, this also represents one way students are being constructed as corporate subjects through P-TECH.

A critical component included in maintaining and reproducing these values associated with professionalism is the way in which it is performed. In many ways, Goffman's (1959) conceptualisation of identity is relevant here. Goffman (1959) understands identity as

something that is co-constructed based on specific environments and audiences. Through his dramaturgical model, likening the project of identity formation to a performance, Goffman argues that identity should be seen as a project of self-presentation. Applying this to the context of P-TECH, it is clear how students are actively presenting themselves to their mentors, employers, and teachers according to their understanding of what behaviour is "acceptable" and valued in the corporate space. Notably, what is considered to be acceptable and valued is left unchallenged.

When asked what they perceived to be appropriate behaviour in the workplace, students emphasised concrete and observable behaviours such as posture, firm handshakes, eye-contact, and being silent when someone else is speaking. They also identified less salient behaviours such as "showing respect" and "being dependable". These descriptions were almost always accompanied by claims that if they do not have these then they will never survive corporate life. As an example, Justin, a 10th grade student, stated, "They're teaching us what it takes to land the job and keep the job. If we don't behave right, make eye-contact to show we're listening and all of that then we won't last. It's cut-throat."

In his discussion of symbolic action in everyday life, Goffman (1959) also posits that part of the way people perform appropriateness entails covering aspects of themselves that do not match or may be stigmatised in order to pass as a legitimate member of the community. They are being trained in school on how to foster "idealised" versions of the role (Goffman, 1959, p. 30) that educators and the private partners repeatedly reminded me they would not otherwise have because they do not have professional role models at home.

By accepting Goffman's understanding of identity being performative and assessing identity in the context of P-TECH in the way students are being constructed as corporate subjects, the significance of cultural capital and its implications become clear once again. Because forms of capital act as a means by which dominant groups maintain their position and status (Bourdieu, 1986) P-TECH can be seen as reinforcing dominant-class values

associated with these tastes and behaviours through micro-level interactions. It highlights how the microprocesses involved with identity are intimately connected to larger social structures.

In sum, the connection between Goffman's identity and Bourdieu's cultural capital is expressed through cultural capital being used to craft a persona/demeanor (corporate subject) that is presented through interactions with other corporate subjects in actual and simulated corporate environments. Another consequence of the educators and industry partners adopting an uncritical gaze toward issues of race, class, and gender, is that it creates more risk of marginalised students' developing potentially alienating identity dissonance as they increase cultural capital and continue to be socialised into corporate subjects. This is another reason why representation is important and why P-TECH educators should engage with critical discussions of race, class, and gender in relation to technology and industry in general.

5.5.2 Identity-technology interrelationships: identifying with computing and IT careers

Technology was central to the culture and everyday practices of Kettler's P-TECH program. A prominent and repeated expression heard among Kettler's P-TECH students and educators was "we're a Google school" because they utilized Google software and devices in each of their classes. Despite not being a formal partner of the school, there were also many references to IBM each day in the classrooms. While different IBM actors had a strong presence in the school, the students did not exclaim that there were an "IBM school" most likely because they were not a formal partner and they recognised who their formal industry partners were. The computer lab where they took their college-level Introduction to Computers course was adorned with the logos of technology companies including Google, IBM, Apple, and Microsoft. There were posters with inspirational quotes from prominent technology figures Bill Gates and Mark Zuckerberg.

Many students aspired to become "tech people" and work in the IT field. Students discussed the disparities between them and "tech people" and how they did not think they would be able to pursue the IT jobs without P-TECH. Daniel, a 10th grade student, discussed his motivations for joining the P-TECH program while demonstrating this disparity between himself and the typical person that pursues IT by stating:

> I can say if it weren't for this (P-TECH) I wouldn't have a chance at getting one of those jobs. I never saw myself as a computer nerd but I do like it and it's a great opportunity and my mom said I would be stupid not to take it.

The students also did not identify with traditional identities or stereotypes associated with computing. Computer experts are often thought of as highly intelligent and socially awkward (Cahoon & Aspray, 2006; Mendick & Moreau, 2013). There were several students that have been interested in gaming and computing from a young age but they were quick to distance themselves from these associations. As an example, Isaiah, a 10th grade student, told me, "I'm a gamer but I'm not like the typical geeky gamer, you know? I'm not a genius and I can talk to girls (laughter)". Most recognisable figures representing success in information technology are white and privileged men such as Bill Gates, Mark Zuckerberg, and Steve Jobs. It has been noted that computing and information technology identities are often gendered, racialised, and classed (Warschauer, Knobel, & Stone, 2004) and these are examples of that.

There have been calls to broaden identities in computing in order to attract more youth, especially girls, and in some ways P-TECH may be helping to accomplish this. A notable concern has been that these identities and stereotypes may dissuade people from pursuing technology careers. Over an extended period of time, if a majority of P-TECH students were to enter IT, the resulting increasingly diverse IT workforce might help reconstruct popular perceptions of identities associated with computing. Ultimately, the P-TECH model may have a potentially transformative impact on students' understandings of what it means to be an IT professional. However, the challenges at the school detract from that.

5.5.3 Aspirations and tech sector as the promised land

As noted above, responding to the question about where they see themselves after P-TECH, a majority of the students stated that they wanted to pursue careers in computing and work for a company like IBM. Students stating "they are going into the tech sector" aspirationally described employment in the technology sector as stable and lifelong. Prominent in the responses was this idea that the technology sector is a promised land that would offer social mobility and security for their families. The following quote from Justin (10th grade) serves as an example of this shared perception among students:

> Well I know all of the money is in tech. Tech isn't going anywhere so I know if I go into tech then I'll be set for life. I don't know what I want to do exactly yet but getting into the field with computers and everything would just really be helpful and I wouldn't have to worry.

Students' responses regarding their future aspirations are embedded in a specific market context that deserves attention. Despite the significant downturn of the technology sector in the early 2000s, the sector's ability to weather the most recent recession drew global attention and praise. In an article published by the U.S. Bureau of Labor Statistics, the technology industry was credited with helping post-recession job recovery and stated that the technology industry was growing at a quicker pace than others (Havins, 2014). The quick recovery from the 2001 downturn and the resilience of the industry during this last economic recession solidified the public's perception of the resilience and stability of the technology sector that is encapsulated by the students' responses as technology companies and the technology sector continued to boom. Today, in a time of great political and economic uncertainty, the draw of the technology sector is arguably even stronger.

Despite the encouragement from IBM and other private partners of middle-skill jobs that do not require a four-year degree, there was a large contingent of P-TECH students at Kettler that did plan to attend a university after graduating. Many of them explained that this was because attending college was not an option for their parents and they felt they would be able

to save enough money by earning the associate's degree at no cost in order to transfer to a four-year institution.

Relatedly, many of the students said they were "sold" P-TECH at recruitment events when Ms Hernandez said they would be earning around 60,000 dollars per year after graduation. Responding to my question about her motivations for joining P-TECH, Jasmine, a 10th grade student said, "also this was marketed toward us, one of her points was 'you can be making 60 thousand dollars when you graduate high school' and that got so many people in." This aligns with the dominant discourse found in the P-TECH articles that tout the model as 'a ticket to the middle class' and 'a pipeline to prosperity' (Baker, 2013; Holst, 2013; Davis, 2014) . The appeal of the technology sector stemming from perceptions of the technology industry as stable and prosperous was further strengthened by this pipeline to prosperity rhetoric that dominates P-TECH marketing. This coupled with the active construction of corporate subjects detailed above demonstrate ways in which the P-TECH model is influencing students' identities and aspirations.

The shaping of aspirations through the model is also a form of governmentality by seeking to produce IT labourers that in turn strengthen the technology sector and advances the government's goal regarding economic competitiveness. IBM's promotion of middle-skill employment is a strategic move to fulfil an observed gap in the sector that is believed to ultimately strengthen it and the country's economic competitiveness. Once again, while it may be the case that students will obtain employment upon graduating from P-TECH it is important to assess the limitations and consequences of training students specifically for middle-skill jobs instead of blindly accepting the model as mutually-beneficial. This mutually beneficial framing also has consequences for individual responsibility.

5.5.4 Individualised responsibility

Many students referenced their parents' disadvantaged backgrounds when discussing why they chose the P-TECH program. They often stated that they have this opportunity that their

parents did not have so they have to take it in order to pursue a stable and lucrative career for their family. They emphasised their desire to make up for the sacrifices their parents made for them. Notably, students recognised and discussed their parents' backgrounds and financial struggles not as the result of poor decision-making but circumstantial. Although the students did not view their parents' disadvantages this way, when it came to their own futures there was a pronounced individualised responsibility discourse in their responses. Aamira, a 9th grade student, stated:

> My mom, she came from a really hard life. My grandma taught her that she was just a housewife so she wasn't going to be much in life and my mom told me I could be anything I want to be if I put my mind to it, if I set to it. If I don't make something of myself with this opportunity then that's on me.

Aisha (9th grade), situated the individualised responsibility in the context of P-TECH and technology's place in society. She expressed:

> And in the way our world is going, technology is so huge this is a good basis for pretty much any other corporate job in tech so I thought it will be a really useful associate's degree to have under my belt that will open doors and then it's up to me to take advantage of it. Their giving us the tools to succeed, we just have to go out there and use them. Our parents didn't have this chance so we're lucky.

This construction of individualised responsibility for the consequences of their "choices" has harrowing long-term implications. If these students choose to pursue other careers outside of their P-TECH training or wish to move up in their job that requires more formal training and credentials such as a four-year degree, the student might feel it is their fault that they are not able to advance. Ultimately, social inequalities are perceived as consequences of individual preferences and decisions. Students view their futures entailing an array of options that they can choose from based on their preferences. The issue with this is that these students' "preferences" are also being shaped and constrained by the industry partners and educators within the P-TECH model.

5.5.5 Summary

Overall, technology and what it means to be a professional are at the center of the P-TECH model and work to influence the students' identities in various ways. None of this is to

suggest that the students are completely passive actors. The discussion is also not meant to present identity formation or the building of subjectivities as a linear process where what is taught through P-TECH overrides the multitude of sociocultural variables informing each person's self. As made clear through the utilisation of Goffman's conception of identity above, identity is complex and multifaceted. The students' referencing their familial positions as influencing their aspirations demonstrates how different socio-cultural layers underscore the process of negotiation in formulating subjectivities. It is the case that these students might not otherwise be exposed to these networks to build their social and cultural capital or receive the training perceived as necessary to thrive in a corporate setting. However, this business-oriented education embedded in the P-TECH model has the ability to "redefine who you are in the deepest sense, pushing you away from developing and acting upon your own vision and guiding ideas" (Schmidt, 2001, p. 280). As such, the implications of transferring and normalising corporate values in school warrants close attention and caution to ensure students are not exploited.

Ultimately, the microprocesses taking place are intricately tied connected broader political economic forces. The prominent IT-based discourses and uncritical praise of the technology sector helps to shape individual identities and reifies technology companies' privileged position in society. Karen Ho (2007) discusses how Wall Street employees credit external forces (i.e. the market) for their layoffs before the most recent recession rather than the culture, values, and everyday practices of investment banks (p.234). Ho illustrates how the dispersed responsibility from the corporations, coupled with the lack of recognition of how workplace values and practices, contributed to the creation of unstable markets that resulted in her participants' layoffs. Similarly, the dispersion of responsibility onto the individual or external forces such as "the market" absolves private partners and the state, which is ultimately responsible for the US education system, of responsibility to address systemic inequities. The P-TECH program at Kettler, and P-TECH model at large, is perpetuating this

by normalising business logic and conditioning students to internalise the valorisation of over-working under the guises of dependability and healthy competitiveness. In the eyes of the students, they are being given every resource and opportunity needed to succeed through the model so if they do not then it is either because of their own decision-making or broader market forces.

5.6 Technology at Kettler

As made clear throughout this chapter, technology played a fundamental role in Kettler's P-TECH program. Many of the students and educators held the belief that technology, while not the complete answer, could help students overcome structural disadvantages relating to class inequity and unequal opportunities. Considering the ways in which the mission and aims of P-TECH were embodied and celebrated in Kettler's P-TECH program, this celebratory view of technology is not surprising. However, it was still particularly interesting to hear this from the educators because each noted the deeper issues these students face when discussing challenges and barriers for success. Take the following quote from one of the steering committee members and Workplace Learning teachers for example:

> I'd say the ones who don't have Internet access also don't have a phone or a computer, you know what I mean? It's like a laundry list of reasons why, it's not just, 'oh, we don't have Internet access'. These students are facing much bigger problems at home and outside of school than not having a computer.

What this quote demonstrates is how the educators could acknowledge the struggles of these students and the limitations of technology to fix them. However, the pattern of seemingly uncritical views of race, class, and gender in the program continues in the context of technology.

Considering the influence of technology's immaterial aspects throughout Kettler's P-TECH program through its culture, interests, and values, it is not surprising that the technological hardware itself also played a central role. Despite not being the most technologically resource rich P-TECH school I visited, it utilised technology the most in and

outside of the classes. In addition to the library computers, one computer lab, and computers in the Digital Arts class, the program had two carts holding sixty Chromebooks in total that were shared across P-TECH classes. There were many instances where a teacher was planning to utilise the laptops but other teachers were using them first. When this happened, the teachers would ask the students to use their smart phones for the lesson. The program adopted an informal bring your own device (BYOD) policy that has been increasingly popular in schools because it increases access to technology without the financial burden of purchasing a device for each student. This blended approach was useful in adding to the technological resources available in each class overall but it also highlighted existing equity issues where not every student owned their own devices. In those instances, teachers would ask students to share or would make the activities collaborative so everyone could participate.

Another challenge expressed by the teachers was the feeling that they had less control over what the students were doing on their own devices. Ms Johnson, one of the Workplace Learning and science teachers explained that the students are less likely to be doing anything inappropriate or abuse their time with the devices if they are on the school-owned Chromebooks because she tells the students that their every click and search is recorded. She said she did not think the students believed it but they also would be less likely to take the risk. Other teachers commented that it was harder to monitor their activity on the smaller screens when they use their smart phones. Using technology as a mechanism of control was a theme throughout Kettler's P-TECH program.

5.6.2 Panoptic Technologies

The college level Introduction to Computers course is taught by an adjunct professor, Mr Jackson, from the partnering community college. Mr Jackson comes to the high school to teach the course in the school's computer lab twice a week. Mr Jackson, often with the help from one of the students' aides, presided over the computer lab which had around 30 desktop computers lining the walls and a row down the centre of the classroom. Mr Jackson's desk

overlooks the students but not all desktop screens are visible from the professor's desk. He consistently reminds the students that he is monitoring their movements from his screen and when he is walking around helping individual students with the lesson the students' aide can watch the screen and monitor the activity.

The course itself was essentially a typical online course with the professor facilitating in person and helping students with questions as they are working on the lessons. Each class session starts out with Mr Jackson listing what lessons the students should be on and what lesson they should aim to complete in that class period. Because there was a wide range in terms of the students' skill levels and pace, Mr Jackson would ask those that were ahead to partner with the students that were behind in order to help catch them up. Mr Jackson would remind the students that he can see what each is doing on their computers in an attempt to keep them focused. He would also occasionally project students' activity from their computers on the white board in front of the class if he caught them doing something they were not supposed to. This was a strong incentive for students to stay on-task. Similar to the other classes, Mr Jackson would repeatedly ask students that were talking or not working what the repercussions would be in the "business world". In response, the students would almost always refocus and get back to work. Overall, the course was tightly managed.

There was great disparity between the way the Introduction to Computers course was ran and the students' behaviour in the Digital Arts college course. The Digital Arts course is another college level course but it is taught by one of the high school's teachers, Mr Mandel, who has a master's degree in Digital Arts so he meets the requirements by the community college partner to teach the course. The class looks like a shop class[4] that has been repurposed as a computer lab. There was a large drafting table in the centre of the room and desktop computers lining the walls. The teacher's desk was by the door right as you enter. The students in the class were supposed to be finishing their portraits in Photoshop but a

[4] Shop class refers to classes in American schools that teach practical skills such as woodworking, welding, drafting, and carpentry.

majority of the students were watching videos on YouTube and others were talking. Some students were doing this because they had finished their portraits ahead of schedule and others were simply avoiding the assignment. When I asked Mr Mandel what he perceived as the biggest challenge he said it was keeping the students focused. He spends most of the class sitting at his desk, getting up when a student raises their hand for help. One student I spoke with explained, "that class is out of control. Everyone just does whatever they want because they know they won't get in trouble. It's different than Professor Jackson's class where we know he's watching us."

It is interesting to note that Mr Jackson, who spends most of his time at the college teaching college-aged students imposes more control and manages the students' activity much more than the high school teacher teaching their Digital Arts course. Mr Jackson said he does not treat the P-TECH students the same as his college-aged students because his college-aged students are more mature and "autonomous adults" despite the students only being a year or two younger than a majority of community college students. Mr Mandel stated that it is the students' responsibility to pass the course and if they choose to not do the work that is up to them. Part of this disparity could also be attributed to different values in subject area training where an art educator may value exploration and autonomy in the creative process as opposed to someone with an engineering and computer science background where the training is more well-defined and rigid. While this could also be dependent on familiarity and experience in working with high school students, it is important to note that every business-oriented class taught, including Workplace Learning, Speech, Introduction to Business, and non-arts based computer-centred courses such as Introduction to Computers and Introduction to Computer Science, were tightly managed. I would argue that this is a reflection of the values and underlying ideologies of these subject areas. Utilising technology and the rhetorical strategy of asking students what IBM or their

employers would think of their behaviour in order to monitor and control the students are reflective of the subtle transfer of ideologies, values, and aims of P-TECH.

5.6.3 Digital disconnects: Laptops on loan and the late bus

Part of the central positioning and heavy reliance on technology, including the use of Google Classroom in each class in Kettler's P-TECH program is done with the aim of enhancing digital participation and increasing educational equity. This idea that centralising technology in school helps their aim to equip students with the digital skills and experience necessary to compete in the labour market reflects the celebratory attitudes surrounding technology's affordances and the belief that it can act as an equaliser. Once again, this discourse was prominent in early digital divide literature and it has since been acknowledged that there are many more layers contributing to exacerbating inequalities attributed to the digital divide. Ubiquitous and quality access, as well as level of skills have been established as indicators for persistent inequities stemming from digital technologies. Again, although popular understandings of the digital divide have matured well beyond the binary conception of "haves" versus the "have-nots" and the steady growth in the number of computers available in schools, many are still struggling with equitable access among their students (Warschauer, 2011). The two most prominent challenges in terms of technology and Kettler's P-TECH program were students' lack of ubiquitous access outside of school and educators figuring out how to navigate the range of skills in each class.

In order to alleviate the lack of access issue, the P-TECH director had twelve laptops donated for students to check-out if they do not have a computer at home. Not all students were aware of this resource. During an interview with one student who expressed frustration for not being able to complete all of the assignments I asked if she had asked Ms Hernandez to check out one of the laptops she said she was not aware there were laptops to check out and must have missed an announcement about it. Because Ms Hernandez was also in charge of discipline at the school, most of the students checking out the laptops were those she

regularly communicated with for disciplinary issues. Despite this, the laptops on loan were helpful for allowing students to type their papers but because many of these students did not have Internet access at home they were still unable to complete the research or access assignments on Google Classroom when needed. This is a common critique and point of contention surrounding the impact of one-to-one laptop programs but it is widely accepted that access alone is not enough (Selwyn & Facer, 2013; Zheng, Warschauer, & Farkas, 2013).

Another way the school has tried to combat this issue is by providing a "late bus" that would take students home after the library closed so students could utilise the library computers and Internet and still have transportation home. Although this was helpful for those that were able to take advantage of it, some students explained that they had to go home to care for their younger siblings while their parents were at work so they were not able to take advantage of this help.

Other students said the teachers will often give them extra time, so they can catch up on work during their study hall periods if they have it. They did not have specific numbers letting educators know how many students did not have a computer or Internet access outside of school but it was enough that all but one of the laptops were checked-out during my time there. While access is a prerequisite first step toward equitable technology use, this further illustrates how it is not enough for equitable digital participation.

The other dominant challenge expressed by the educators regarding technology throughout the P-TECH program was navigating the wide range of technological skills across students. Differential digital skills have been acknowledged as another important indicator of digital inclusion when assessing the multifaceted phenomenon of the digital divide (Dimaggio, Hargittai, Celeste, & Shafer, 2004; Helsper & Eynon, 2013; Van Deursen & Van Dijk, 2015). Given the range in the quality of access to a computer or the Internet, it is unsurprising to find that there were disparities in the students' digital skills. As mentioned

above, in the Introduction to Computers course the professor had students that were more advanced pair with those that were behind on the assignments to help catch them up. Despite this, Mr Jackson still expressed how challenging it was trying to help all of the students that needed it. He summed up the digital inequalities issues raised here when he stated:

> I have the high flyers help the ones that are struggling but it isn't enough. Those that are being left behind are the students that need extra time at home but a lot of them don't have computers to even catch up so no wonder they're behind. I'm only one person. I need more help or smaller classes to give the help they need.

These digital inequalities had surprisingly significant consequences in terms for the college courses, which is important to note for all P-TECH schools. It has already been established that a significant benefit and core component of the P-TECH model is that students earn an associate's degree at no cost to the families. In order to earn the college credits, the courses are meant to be taught with the same requirements that the partnering community college has for all of their students. The schools operate on different timelines so accommodations were made to stretch out courses for the high school students to match their academic calendars. For instance, the college courses are typically taught in 14 to 16-week terms but they were stretched out for the nine-month school year instead. This was done in order to give students three weeks to complete each assignment to account for the lack of access students had outside of school. Mr Jackson said he normally teaches the course in one term and students have one week to complete each assignment. Despite adjusting the course-length, Mr Jackson said the significant range in digital skills along with feeling ill-equipped to provide sufficient support to each student needing extra help, that he and another professor decided they would have to adjust the requirements or add extra credit opportunities if students were going to pass. Mr Jackson and the Introduction to Business professor told me they ended up adding extra credit and reducing the requirements, stating that it is most important that each lesson is at least covered. When asked whether or not the students were covering everything that is covered for their traditional community college students two of the three professors stated that they were covering the same material but they adjusted the requirements and could

simply not go as in-depth as they do for their other courses because of these challenges. Despite the school's efforts to compensate for inequities in access and use, the issues of access and differing skill levels proved to be barriers for students participating fully.

5.6.4 Summary

Overall, technology held a privileged place within Kettler's P-TECH program. Technology influenced the program and its students in important and meaningful ways. Technology was perceived as an affordance capable of equipping students with skills that would bring about improved life prospects and opportunities. The associations with the IT industry fostered in the program's culture was equated with stability and heralded as a pathway for social mobility. The lack of ubiquitous access was perceived as a challenge but not necessarily a barrier to succeed and reap the purported benefits stemming from technology and the technology sector. The celebratory attitudes toward and beliefs in the promises of technology among students and educators despite experiencing and observing the inequities firsthand reaffirmed the uncritical understanding of and engagement with class, race, and gender in a technological context. Through this, it becomes evident that engaging in these critical discussions is essential for the P-TECH model to be impactful and achieve its aims.

5.7 Conclusion

Kettler's P-TECH program most closely resembles the original vision of IBM's P-TECH model out of the three sites included in this embedded case study. It primarily serves underrepresented and underserved students. Technology plays a central role in classes and is touted as a tool for opportunity. The program has an IT career focus with industry mentors provided for each student. The private partners are heavily involved in the structuring of the program and the development of the curriculum. The college courses are integrated into the students' high school schedules and finally, a majority of the students are striving to become computing professionals.

Being that Kettler's P-TECH program is a distillation of the pure P-TECH vision, it allowed for the model's ideological underpinnings to be unearthed and assessed. Through this, what this chapter began to demonstrate is how the current trends of corporatisation in education cannot be understood separately from the powerful economic forces driving it *and* the importance of assessing how this is manifesting throughout schools at the micro-level in terms of culture as well as students' identities and aspirations. It further illustrates how the political economy and cultural perspective are intricately tied to one another and co-constitutive.

A defining characteristic of Kettler's P-TECH program was the omnipresent business rhetoric and logic employed which worked to control behaviour and construct students into corporate subjects. This was accompanied by a lack of a critical lens toward race, gender, and class which was helpful in highlighting the social cost of the corporate-driven restructuring of the US K-12 education system. The conditioning of P-TECH students toward "appropriate" professional behaviour and equipping them with skills currently valued by industry threatens traditional pillars of education including its humanistic foundation and goal of civic engagement. The current trends of corporatisation will be advanced through the continued normalisation of business logic and values in public education. In this way, the P-TECH model, as it appears at Kettler, helps to propel the shift toward instrumentalism and vocationalism of the public education system.

It is true that private companies have had involvement in public schools for several decades now, however, what P-TECH represents is a new style of corporatisation led by the technology sector, which demands more economic and political power. IBM's P-TECH is a way to have public schools directly serving their interests and be tailored to their values. This is accomplished under the guise of shared voice and democratic preservation through a public private partnership structure.

In recognising that this shift is taking place and P-TECH is propelling the corporatisation of education even further in a more direct way, I also acknowledge that based on these values, in the eyes of those involved in P-TECH, they are providing an opportunity for students to acquire skills and jobs that they might not otherwise have access to. It was made clear by the students that they would not otherwise know what is considered to be acceptable behaviour in professional workplaces. Moreover, through the discussion on identity, it was evident that P-TECH has helped them gain confidence in knowing they could become computing professionals. I acknowledged other affordances such as potential opportunities for students to access spaces such as IBM and develop connections with other private partners and the potential contribution P-TECH can make toward increasing diversity across IT and shifting public perceptions of who computing professionals are. However, when left unchecked and unchallenged, Kettler's P-TECH program illuminated how the model disproportionately benefits private partners and furthers the technology sectors influence. This was particularly salient in the discussion on identity and aspirations where the marketing and promotion of IT and technology companies played a pivotal role.

As discussed throughout the chapter, technology played a central role in forming the culture of Kettler's P-TECH program which in turn influenced students' identities and aspirations. I pointed out how educators and students closely identified with the technologies they used which was evidenced by statements such as "we're a Google school" along with the pervasive references to IBM in the classroom. Recognising the strength and scale of the education market, this was highlighted as another way technologies companies are benefitting. This benefit is well-known and has been supported by others such as Saltman (2017) when he exclaims, "The survival and flourishing of personhood for corporations depends on the way that flesh and blood people identify with the brand of the corporation..." (p. 108). Without looking at both the political economy and culture at the micro-level, these implications would not be caught.

As supported throughout this chapter, the culture of Kettler's P-TECH program is based on the promotion of being apolitical and value-free while unquestioningly promoting the values, norms, and aims of business. By not engaging in critical discussions about race, class, and gender, especially as they relate to the technology industry in this context, limits opportunities to develop understandings of and address underlying forces responsible for social inequalities.

Serving as one example among many presented in this chapter, the discussion of P-TECH's influence on identity illuminated how this dialogue is important in order to avoid the repercussions of individualised responsibility discourse that is prevalent in education policies. In order for P-TECH to remain close to its original mission and achieve its aims, as it continues to spread, it is crucial that educators and partners are engaging critically with issues pertinent to the students' everyday lives.

Chapter 6 ACME Tech

ACME Tech in New York City was the most politically charged site within this case study. My time at ACME Tech began less than two months after Donald Trump took office and exactly one month after Betsy DeVos, billionaire philanthropist and school choice activist, was confirmed as the new United States Secretary of Education. Beyond providing the socio-political context during my time at ACME, this is important to note because New York City is the nation's largest district with over 1800 schools, 1.1 million students, and seen as a microcosm of the US education system. While many of the issues its schools face are intimately related to the city's distinct social, cultural, and political history, New York City has long been used as a testing ground for education policies with national significance. Indeed, the city was the pioneer in promoting market-based reforms (Chapter 2) during the first decade of the new millennium. The district where ACME is located is said to be the district that first caught corporate reformers' attention after it had been promoted in many education studies and gained national recognition as a model of urban school reform (Ravitch, 2010). This occurred around the same time that Michael Bloomberg, another billionaire philanthropist, became mayor.

As part of his campaign promise to improve the school system and mould it into an exemplar model for education everywhere, Michael Bloomberg and his appointed chancellor, Joel Klein, initiated an overhaul of the city's public schools through an approach based on business principles (Ravitch, 2010; Sims, 2017). As discussed in chapter two, this market-based management style reform was driven by top-down accountability measures, "choice", merit-based pay, and high-stakes testing that soon permeated schools throughout the rest of the country. Joel Klein hired management consulting firm McKinsey & Company along with other corporate American leaders to lead in his endeavour for applying business principles to public education (Sims, 2017). New York City's national prominence and leadership role in the US public education system, its history with and proximity to leaders of corporate

America, and Joel Klein's role in establishing P-TECH (Chapter four) are all important factors in understanding the interrelationship between the state, industry, and wider communities involved in P-TECH's shape and influence. Considering its location, ACME Tech gives the richest insight into the implications of the federal government's role in the US public education system and provides the conceptual thread that ties the study's different scales of analysis together. These implications were perhaps made even more apparent considering the country's political context during my time at ACME Tech.

During my first week at the school I was invited to observe a meeting with members from the leadership team at the New York City Department of Education (NYCDOE) where they discussed how the new administration and Betsy DeVos would affect the city's schools. Two prominent sentiments were expressed during the meeting, which are central to the dominant themes throughout this chapter. First there was consensus that the new administration's dedication to industry-focused education along with a continued commitment to STEM could work in P-TECH's favour and may bring more federal funding opportunities for their schools. This optimism was partially abated during the meeting when a member of the leadership team stated that funding for schools with a high concentration of students from lower income households would likely be reduced. One Early College Initiative (ECI) member stated:

> Well I think we have reasons to believe that this could open more doors for P-TECH in general, financially and otherwise, and we'll keep an eye out for more federal initiatives to support it. What I'm more concerned about is where that money will be taken from because given what we've seen so far it's not like this is the most sympathetic administration for where our students come from in particular.
>
> Corey, ECI Program Coordinator[5]

One of the P-TECH program developers interjected with:

> Right, so it's about balancing how much we might lose from existing assistance programs with how much we might gain for P-TECH and other ECI schools.

[5] All individual names and site names are pseudonyms. Given the uniqueness of this school, my ability to prevent readers from seeking to identify it is limited. However, extensive efforts have been made to ensure the anonymity of individuals to the best of my abilities.

> How can we plan for that? Frankly, I'm more concerned about what to expect in the coming years with Title I funds[6].
>
> Maria, P-TECH Program Developer

The other dominant sentiment expressed during the meeting was concern over potential threats to previously established protections for their students in terms of immigration, disability, and economic resources. During the time of my field work, there was heightened concern over what would happen to the undocumented students currently protected under the Deferred Action program called DACA that is currently under threat of being discontinued. An NYCDOE official that also served on the steering committee for P-TECH expressed his concern this way:

> What we're basically trying to do here is put the right support mechanisms in place and come up with a plan based on what we think is coming our way. We're going to expect funding cuts particularly for our student demographics. What about DACA? I have students coming in worried about doing these internships and drawing attention to themselves. What can we do to support our students?
>
> Davis, NYCDOE Official

This is particularly problematic for career and technical education (CTE) schools like P-TECH because without DACA these students would no longer be eligible for paid internships, which is a core component of the P-TECH model.

Underlying these dominant sentiments expressed at the meeting is the importance of understanding the unique social, political, and economic contexts ACME Tech and its students are embedded in. The purpose of this chapter, therefore, is to explore these contexts and formulate an understanding of how they impact the shape and culture of the school and the roles that industry and technology play. In order to accomplish this, the discussion in this chapter is supported through contextual details and empirical evidence. These detailed descriptions and findings from ACME Tech are meant to aid in the study's overall nuanced picture of these corporate driven initiatives and digital inequalities. As such, one argument I

[6] Currently Title I funding has remained stable for the next fiscal year but the change in distribution of those funds where states are given more does mean high-poverty schools can expect fewer dollars.

make throughout this chapter is how these unique social, political, and economic forces are actually working to mediate the apparent corporate influence seen in the other schools. These forces, I argue, are shaping the role technology plays as well. In line with this and addressing the issue of P-TECH's impact on existing inequality, issues of cultural capital and organisational habitus are discussed in relation to the unequal distribution of benefits at ACME Tech.

In order to fully understand what is influencing the cultural make-up, organisational structure, the place technology occupies at ACME Tech, and who is benefitting across the partnership, it is important to first contextualise ACME Tech's place within New York City's large public education ecosystem. What follows first is an outline of the city's organisational and governance structure. The remainder of the chapter discusses and analyses key characteristics and components of ACME Tech with a primary focus on commercial influence and the role of technology.

6.1 Organisation and Governance of New York City Public Schools

Although it is currently being challenged, since 2002 New York City's educational system has been centrally controlled by the mayor as opposed to an elected school board (as the city previously had, along with a vast majority of the country). The mayor appoints a chancellor who heads the New York City Department of Education (NYCDOE) in conjunction with a leadership team. Serving as one component of the city's educational governance structure is the Panel for Educational Policy (PEP), which is made up of thirteen people, eight of whom are also appointed by the Mayor with the remainder chosen by Borough Presidents. The other components of the governance structure include superintendents, principals, citywide and community councils, and school leadership teams. The NYCDOE has nearly 135,000 full-time employees including teaching, administrative, and executive staff members (Department of Education, 2017). The role of the NYCDOE is to manage the city's schools, partnerships, and funding. The 2017-2018 NYCDOE operating budget is $30.8 billion. New York spends

$19,818 per student annually compared to the national average of $12,605 (U.S. Census Bureau, 2016). This is largely determined by the size of the district and cost of living.

The NYC public school system is organised into thirty-two community school districts encompassing all elementary and middle schools, with high schools being sorted into five large districts that closely map the City's boroughs: Manhattan, Brooklyn, Queens, the Bronx, and BASIS, a district that includes all schools in Staten Island and part of Brooklyn. Each district is further divided into smaller zones that are neighbourhood public schools for students living within that designated geographic area. While the NYCDOE prioritises the assignment of students based on proximity it is not always the case that students will attend their neighbourhood school. The zoning of schools in New York City is highly controversial as critics argue that the zoned schools together with gentrification trends in the city have worked to increase persistent and growing racial and economic segregation issues across schools (Kucsera & Orfield, 2014). Occurring alongside re-zoning efforts in some districts, some parents have called for the implementation of "controlled choice", a method developed by Harvard education professor Charles Willie and education planner Michael Alves, that was first used in Cambridge, Massachusetts in an attempt to desegregate schools and promote equal access to educational resources for all (Willie & Alves, 1996). Controlled choice combines family preferences, proximity, and socioeconomic data to assign students to schools. In September 2017, the NYCDOE announced a plan to first implement controlled choice in Manhattan stating that students qualifying for reduced lunch, English Language Learners, and those supported through the welfare system will be prioritised. How students are sorted into NYC schools is complex and varies depending on the grade level. The process is outlined in-depth below when discussing how students choose to attend ACME Tech.

6.2 ACME Tech Profile

ACME Tech is a communications, media, and advertising-focused P-TECH school located in the heart of New York City. The school opened its doors in 2014 with just 97

students. Currently there are 279 enrolled students for its three existing grades: ninth, tenth, and eleventh. Similar to all P-TECH schools, ACME plans to add another 100 students each year and maintain enrolment around 600 for the entire school once all six grades are filled. Although it is a relatively small school, due to spatial constraints the average class size is 24 students, which is just two students less than the city-wide average (Department of Education, 2016). ACME is a stand-alone P-TECH school meaning the entire school is organised and run as a P-TECH school as opposed to the within-school model from the previous chapter. The school itself is housed in a large multi-story building with a different high school occupying each floor. As part of Michael Bloomberg's reform strategy, many of the city's large underperforming high schools were phased out and many new smaller schools were launched. In order to save on building expenses, it is common now to see "shared campuses" where multiple schools are housed in the same building.

As you are walking up the stairs to ACME Tech's floor you are greeted by colourful murals and inspirational quotes painted on the walls. The school's motto "Start Here, Go Anywhere" is painted on a mural in the stairwell just before the entrance on ACME's floor. Through the double doors are ACME's core values: scholarship, creativity, character, empathy, and responsibility, hanging up on banners. Similar to the overarching P-TECH goals, ACME is a STEAM[7]-focused high school whose central aim is to equip its students with the perceived 21st century skills needed for today's labour market. Beyond this and providing what the principal refers to as "a rigorous academic experience," the principal and partners stated that their primary aim is to funnel students into the advertising industry in order to improve representation in that sector as well as provide these students with a chance of achieving social mobility. When I asked Principal Allen of ACME Tech what the goal of this model and school is, he responded with:

[7] STEAM is the same as STEM but with arts included. It stands for science, technology, engineering, arts, and mathematics.

> If we want to actually help our students have real opportunity for success in the future, and for our kids it's about moving them from poverty to out of poverty, we have to find ways to explicitly teach this and a way for us to do it is to be like look, we're going to partner with a field, an industry that wants our kids, like they are the demographic and so we know that in advertising women and people of color are vastly underrepresented. It's a win-win for getting our students stable financially and improving representation.

Over 80 per cent of the students are recognised as economically disadvantaged with 82 per cent qualifying for free or reduced lunches before the city's recent move offering every public school student free lunches (Piccoli & Harris, 2017). About 45 per cent of the students' families qualify for social welfare benefits and nearly 30 per cent of the students' household incomes fall below the federal poverty level (Department of Education, 2017). Forty-five per cent of ACME's students are Hispanic, 40 per cent are Black, and the remaining are split between White, Asian, and American Indian. Where ACME differs from the other P-TECH schools in terms of demographics is in the distribution between male and female students. ACME's female students make up 53 per cent of the total student population in contrast to a majority of the other P-TECH schools, which are heavily male-dominated, though this could be a function of the borough being more female dominated in general. When comparing the distribution to the borough averages, ACME falls 1.5 per cent below other boroughs though it is 4.2 per cent above the city average (Department of Education, 2017).

Unlike the persistent national trend concerning inequitable distribution of well-qualified teachers serving in schools with greater numbers of low-income and underrepresented students (Adamson & Hammond, 2011), ACME has an unusually experienced and qualified teaching and administration staff. The principal holds a doctorate in education from an Ivy League school and worked at the NYCDOE headquarters for several years before starting ACME Tech. The guidance counsellor is a former teacher and holds several postgraduate degrees as do many of the school's teachers. The average teaching experience of ACME's teachers is nine years. While this is a positive and key variable in determining students'

achievement (Villegas, Strom & Lucas, 2012), one educator I interviewed described the biggest challenge working at ACME and said what is still needed are more teachers that can directly relate to the students' specific cultural experiences:

> It's working so intimately with these children and their families and their issues and their situations. It is emotionally draining. These students need more role models here that truly understands, first-hand, what they go through. There are only a few of us carrying that entire load and everyone benefits, especially our students, from getting more of us in here for them to connect to and look up to.

There are many reasons having teachers from non-dominant backgrounds in schools serving a high percentage of students from similar backgrounds is valuable. Researchers and advocates have stated that having teachers who understand the cultural experiences of students with whom they share cultural backgrounds can not only improve student achievements and educational outcomes through culturally relevant teaching but they also act as advocates and cultural brokers for students and ultimately help to build important trust-based connections (Villegas & Irvine, 2010; Achinstein and Ogawa, 2012). Perhaps the most salient divergence of experience here is what it is like for the educators and students to traverse the space in which ACME Tech is located each day.

6.2.1 Spatial Identities and the Politics of Space

> A whole history remains to be written of *spaces*—which would at the same time be the history of *power*—from the great strategies of geopolitics to the little tactics of the habitat. (Foucault, 1980, p. 149)

Any endeavour that seeks to examine power relations within and between organisations cannot ignore the importance of space as a structuring material reality (Shome, 2003). An understanding of spatialities of power is particularly useful here because it highlights how relations of inequities are partially shaped by spatial relations, and the spatial context of ACME is materially and culturally significant. Particularly for ACME, a "critical spatial perspective" (Soja, 2010) is useful for highlighting the importance of space in relation to educational barriers and opportunities for underserved populations by assessing how social, economic and educational factors interact with specific spatial dimensions. This approach

provides a way to identify the different ways in which spatial and social relations, including racially segregated communities and schools (Orfield & Frakenberg, 2014), have significantly different material consequences for marginalised groups. Previous work that utilised a critical spatial perspective provides meaningful insights for understanding the students' spatial experiences with ACME. These insights ultimately aid in the interpretation of findings (Chapter 8) related to questions of culture and the impact the school has on students' identity (Chapter 2).

ACME is located in District Two. Within the district are some public housing projects and areas of poverty but it also contains some of the wealthiest New York City neighbourhoods. There are around 120 primary and secondary schools in the district and it serves about 60,000 students (Department of Education, 2016). The district's data show a significant level of racial and social stratification but what is more striking is how this stratification is inscribed in the very geography of the district.

Every morning students from ACME Tech exit the subway in the heart of the city and take a left toward the school. They exit with the same group of professionals each day except this group takes a right to head to the city's financial district. Also to the right is the NYCDOE headquarters. As the students take a left on their path to school they walk behind a major hub of the New York Police Department (NYPD) and grand court buildings. These buildings are invasive and loom over this group of students literally and metaphorically. It is widely known that there is a stark imbalance along racial-ethnic lines for those that come into contact with the police in New York City (New York Civil Liberties Union, 2017). The outcome of NYC's "stop and frisk" policy is an increase in the exposure of people of colour to NYC courts, the same courts these students come into spatial contact with every day.

The surveillance and security presence continue once entering the school building where everyone is greeted by multiple police officers scanning ID cards and making sure no one is wearing a hat, has their hood from their sweatshirt on or has headphones on. There are four

floors with a different high school occupying each one. After students and staff pass through the lines everyone goes to their respective floors. On each floor there are a mix of volunteers and security guards monitoring who enters and leaves. Increased police presence in New York City schools has been a growing and contentious topic for the past decade with scholars arguing that this increased surveillance has a disproportionately negative impact on students of colour (Brown, 2003; Lewis, 2006). From a governmentality perspective, where forms of governing others and the self is instantiated through social institutions and organisations (Foucault, 1980), it is clear that the racial and class-based dimensions of this pervasive surveillance can have profound effects on students, resulting in increased self-regulation. The internalisation of this type of control influences the construction of their views on their positionalities in society. These factors all influence the overall culture of the school and I would argue that these forces were more powerful at ACME and worked to overshadow the P-TECH commercialised values in many ways. Further supporting the chapter's opening claim that this was the most politically charged school, ACME students spent a substantial amount of time discussing these issues in and outside of class.

On several of the classroom doors are folders inspired by the statistics listed above that say, "Know your Rights" which hold hand-outs illustrating what to do if stopped by a police officer. Each school I visited had students arrested during my time there, primarily due to physical altercations and in one case possession of a firearm, but ACME was the only school that had obvious resources and support for their students in this way. The teachers were also more supportive and oftentimes encouraged discussions about race, culture and politics. In fact, they would often incorporate them into their lessons. In the Advertising classes teachers asked the students to analyse how different cultures would interpret specific ads. As an example, during one of these exercises the students discussed the advertising industry's role in promoting cultural appropriation. There were many discussions about who works in advertising and how there is a disconnect between those controlling the cultural narratives

presented through advertising and the entertainment industry in general and those being represented. Although they would rarely contribute to the conversations, the industry representatives that visited the classes encouraged students to translate their activism and frustrations into inspiration for their projects. Their primary role in these activities was to guide the students in developing specific skillsets for their projects.

There are many variables that can be attributed to the apparent social and political awareness that pervades the school and has shaped its culture. In addition to the student demographics and the broader political context during my time at ACME, the educators' backgrounds, partner motivations and challenges, and the school's inter-organisational structure all highlight these different variables at play.

6.3 Inter-organisational Structure

6.3.1 Ideological underpinnings and the development of ACME

Principal Allen was working at the NYCDOE headquarters in the former Office for New Schools division when he decided to put the bid in for opening a new school. The five-step application process[8] for proposing new schools and receiving approval takes about six months. Principal Allen knew he wanted to start a career and technical education (CTE) school because he believes in the importance and value of preparing students with tangible and practical skills for industry after they graduate. Being familiar with P-TECH during his time at the NYCDOE, Principal Allen knew that there was enough financial support from the NYCDOE for the model to be sustained and appreciated the fact that the NYCDOE coordinated the partnerships ahead of time. Therefore, he proposed ACME as a new P-TECH school[9].

[8] The five-step application process begins with a short, written proposal to the NYCDOE. Principal Allen told me the DOE used to receive over 400 applications when they were accepting new school proposals. Each subsequent round required prospective principals to expand their written proposals in addition to different tasks such as creating a budget, outlining their theory of action and ability to supervise teachers as well as their professional development plan. Schools would be cut each round until the final round where principals prepare a presentation to present to a panel of NYCDOE officials.

[9] It is important to note that this was slightly different from how other principals of P-TECH model schools in New York City explained their bidding process. The principal of another P-TECH school in

For his proposal, Principal Allen worked with partners in the Mayor's Office of Labour Development to find data on areas of economic growth and where job availability was expected to grow the most in the future. The options presented were health care, tourism, law and advocacy, and advertising. He said he knew nothing about advertising but after meeting with employees at the American Association of Advertising Agencies (4A's) and seeing what a dynamic and expansive field it was he was convinced. The biggest selling point for him was how transferrable the skills would be so students could be supported in pursuing many fields beyond advertising with their training at ACME. Students choose from four different degree offerings from the college partner including: associate's of Science degree (A.S.) in Video Arts and Technology, A.S. in Animation and Motion Graphics, A.S. in Multimedia Programming and Design, and an A.S. in Business (Digital Marketing). Principal Allen pointed out that students would be well-equipped with skills for the data and analytics side of advertising or another field but also would be well situated to pursue the more creative side of the industry.

In addition to preparing students for multiple pathways with transferrable skills, Principal Allen believed the biggest benefit of a career and technical education is exposing students to what it means and looks like to be a professional and have real world experiences. Having worked for Teach for America, Principal Allen appreciated the P-TECH model because he believed in the importance of direct experience for this population of students in particular stating that this is the only way they will gain that exposure and knowledge. He expressed it this way:

> People don't magically learn these skills. We need to teach and sometimes very explicitly like this is what you wear to work, this is how you write an email, this is how you have a conversation with somebody while not texting at the same time. It would be amazing if people just naturally developed these skills and some people do develop them through observation and they're acculturated based on where they grow up and who they see and what they observe. That is not our kids.

New York City told me she put in a bid to lead a new school and was then presented with a few portfolios for proposed P-TECH schools the NYCDOE was looking to open and the principal chose from what was available. It was different for Principal Allen because he worked at the Office of New Schools and was part of the development of these portfolios.

This exposure and teaching of business etiquette by industry partners to a population they state would not have it otherwise is seen as a way for P-TECH students to accumulate cultural capital (Bourdieu, 1986) and is an expressed fundamental affordance of the model. The relationships developed between students and industry representatives through the partnership is also meant to aid the students into obtaining stable and lucrative careers. My interviews with other P-TECH principals showed that it was most common for them to encourage students to utilise the industry connections and go straight to work. This was always qualified by a statement that these students in particular would benefit more by having an income right away. Notably, Principal Allen's goal for ACME students is to pursue college rather than go directly into the workforce which, he claimed, is based on his personal experience and what worked for him.

> This is a personal bias. I know that for some of our kids an associate's degree would be a huge win for them but I really want to set our kids up to go into a bachelor's program afterwards. That's a personal bias which comes from my own upbringing. It provides opportunity and we are a society that increasingly relies on credentials. Maybe even too much but it opens doors.

Ultimately, the belief is that the general business skills along with the wide transferability of the more tangible skills students would learn through advertising would ensure they are prepared for multiple pathways, thus increasing their chances of achieving economic stability and social mobility.

Continuing with the ideological beliefs underpinning the development of ACME is the fact that ACME is an unscreened school meaning there are no entrance exams or grade requirements for acceptance. This was another factor to consider in his bid for starting ACME. When I asked why he chose to make the school unscreened he said:

> It was a collaborative decision. I think that the DOE at the time I was proposing my school was looking for unscreened schools. Philosophically I wanted it to be an unscreened school so it was not, there was never really a debate. I think that schools should be open to everyone and that schools have a moral obligation to educate whoever walks through their door. So I like the idea of an unscreened school

> because we have a population that needs this type of school, needs this type of support and it should be accessible to everybody.

All P-TECH schools are unscreened. However, each principal I interviewed from six different P-TECH schools stated that they were ideologically opposed to screened public schools and those that are in favour of them should not be at P-TECH because it runs counter to the mission of the model. The teachers, however, did not always share this sentiment. Relatedly, one of the more often expressed challenges pointed out by ACME educators was how they were expected to teach at an accelerated pace but also catch up the underperforming students that make up a majority of students at ACME. There is an interesting disconnect here between the educators' awareness and support for the students' specific socio-political realities and this frustration with their academic underperformance. This is more about structural constraints and pressures placed on the teachers from both the federal and local departments of education. While the teachers are aware and committed to helping students navigate the socio-political challenges, they are also understandably concerned about them being deemed as underperforming teachers if their students are not able to elevate their scores.

When I asked Principal Allen about what he saw as the biggest challenge in developing ACME he stated:

> I think the biggest challenge is designing a new model of education that hasn't been done before, that really provides this comprehensive support for students through high school, college, and the beginning parts of a career. Doing it and reimagining the traditional kind of sequential model of education. And then constantly thinking about how do we provide support to kids, academic support, social support, emotional support, financial support to students so that they can navigate this process with us and come out successful on the other end.

This reference to reconsidering the traditional sequential model of education is a defining feature of the organisation of the school. Principal Allen emphasised that what sets ACME and P-TECH schools apart in addition to the industry component is its integrated approach where high school, college, and industry are intertwined and embedded throughout every aspect of the school. Instead of waiting to start college courses after they graduate students

begin right away and curriculum is developed collaboratively with partners to ensure they are learning what industry deems as useful skills. My analysis of the partnership MOUs and interviews with each liaison highlights the ways in which commercial interests are influencing ACME Tech at an organisational level.

6.3.2 Partnership Roles and Responsibilities

Beyond the different variations of the model's structure (within-school, stand-alone, charter), the organisational arrangement within each also varies depending on its location. In the context of New York City, where all P-TECH schools follow the stand-alone structure, they also include the Early College Initiative which is run by the City University of New York (CUNY), and characterised as an intermediary actor between the NYCDOE and the early college schools the CUNY colleges partner with. The early college model was created as a way to make college more accessible and affordable for everyone because students earn college credits during high school at no cost to their families.

The office of early colleges at CUNY were the original partners for the development of P-TECH when IBM's Stanley Litow proposed the idea to the NYCDOE (Chapter four). In addition to coordinating between the NYCDOE and college partners, the ECI office manages a large portion of the funding for the partnering P-TECH schools themselves. P-TECH schools in New York are also primarily funded through various grants like Kettler from the previous chapter but because they are in New York City, they have more grants available to them and more resources for obtaining grants. The director of ECI, Mr. Chlarson, said because of the successful branding of P-TECH most early college schools are being misrepresented as P-TECH schools. P-TECH is just another iteration of the already established early college and career schools with an industry partner added, presumably giving it more weight and legitimacy in the eyes of the public. He said this has been problematic when advocating for funding at the state and federal level and elaborated on this by stating:

> Well because when you take out the P-TECH model, which may be popular, en vogue, but its outcomes are not at all there yet, even for P-TECH the original that I think it's a little risky. We already have very successful early college models here and across the country that have been around for some cases for decades but for the most part since the early 2000s but those are overshadowed now by P-TECH which doesn't have the data yet to support getting more funding.

This disproportional financial benefit P-TECH receives from public funds over the well-established early college schools signifies the influence of industry and its prominent role in the overall educational landscape. The ability for IBM to widely market their model coupled with their strategic alliances and strong interpersonal ties with governments and education (Chapter 4) enables them to further entrench themselves and establish more credibility within education. As time progresses, IBM's legitimacy in education will be further elevated in the public's eye because of this imbalance in funding and their successful marketing strategy. Considering both factors here, that schools that are properly funded are more likely to perform better taken together with IBM's successful marketing strategy, IBM will be credited with P-TECH's success if all goes well for their schools and thus IBM's educational authority will be legitimised. While it has been made clear throughout this thesis that IBM has already been successful in receiving praise for their model without needing the data to support its effectiveness, this increased financial support that may help improve performance metrics may work to solidify and further establish themselves within education.

When asked what the motivation was for CUNY to be involved with P-TECH from the beginning, Mr. Chlarson said it was most likely due to previously established relationships with IBM.

> Well I think I have to assume there were already relationships with IBM. University-wide, partnerships and relationships that this would have just been another you know, partnership. And I think that in those initial conversations, certainly Cass and other folks, and CUNY leadership were excited about the idea of it.

In addition to the previously established relationships, this partnership was also an appropriate fit because the P-TECH model mission aligns neatly with the mission of CUNY and the early college initiative. On the ECI website they state that "ECI promotes social and

economic mobility by restructuring the educational experience for students who are traditionally underrepresented in higher education" (Early College, 2015). This alignment in aims and the shared commitment to serving underrepresented groups makes the partnership a logical fit.

I spent several days shadowing and speaking with the school's college liaison, Mr. Moore. The college liaison is responsible for establishing the program on the college campus with the chairs of each department ACME students will be taking classes in. They help select teachers that are appropriate for and have interest in working with high school students as well. The liaison is ultimately responsible for the students while they are on the college campus and aids the professors in classroom management. They are also tasked with monitoring students' progress and establishing appropriate interventions when students are falling behind. Students are fully integrated on the campus as college students and have access to all of the same resources other students have at the college.

ACME's college partner stood in sharp contrast to Kettler's college partner in terms of support. During my first week at ACME I accompanied Principal Allen and Mr. Moore for the planning meeting with the college administrator in charge of ensuring the appropriate classes are available for the students. At the meeting they discussed which courses would be best and the administrator had laid out a variety of personalised roadmaps based on ability level. They did not face the same financial issues or bureaucratic barriers that Kettler faced.

When asked what the motivation was for the college partner, Mr. Moore said that it is part of the college's mission to work with this population of students and preparing them to be successful. Echoing similar sentiments as the industry partners in terms of motivations and benefits for the partnership, Mr. Moore explained that the college benefits by gaining stronger students that are better prepared. Mr. Moore said the college can be assured that students are more likely to move through to completion with the extra support from the high school, which is also good for their numbers. These are very clear incentives for the college

partners and a natural alignment given that they are in education as well. The incentives and motivations of the industry side of the partnerships are much more complex.

The primary industry partner for ACME is the American Association of Advertising Agencies, or the 4 A's, a trade organisation for the advertising community. Mr. Williams, ACME's industry liaison, described what they do in the following way:

> So it does everything from advocacy in Washington D.C. with regards to some of the initiatives, privacy, and communication aspects to leadership within the community and that's reflected in a multitude of ways whether that is being a champion for diversity which this program hopes to entail and therefore leading in that facet. As well as leading in regard to guidance from how contracts should be created to best practices within the industry.

The specific responsibilities outlined for the industry partner is to bring speakers into the school, arrange off-site visits with agencies, enable job shadowing, and facilitate opportunities for students to compete in relevant advertising competitions.

According to Mr Williams, there were several stated motivations and benefits for the industry partners. The key benefit for the industry is to create a "pipeline" with relevant skills. One major issue the industry faces is high turnover and there is a desire to improve employee retention and they believe if students are primed for the industry with the proper skills and they still choose to pursue it then the companies will know they have a sincere interest rather than others that "fall into it". Widespread efforts have been made by the advertising industry to recruit creative talent at a younger age for the past several years (Oliver, Murphy, & Tag, 2014). The second major benefit for the industry is improving diversity. The advertising industry's struggle with recruiting underrepresented groups is longstanding and widely acknowledged (Chambers, 2009). According to the U.S. Bureau of Labor Statistics, of those employed in advertising, Black or African Americans make up just 4.1 per cent and Hispanic or Latinos comprise 12.3 per cent (Department of Labor, 2017). Mr Williams stated that there is a desperate need to specifically improve representation in the advertising industry and believes ACME can fulfil both needs.

In sum, the college partners are responsible for ensuring students move through the courses and are in the appropriate classes for their designated degrees. The ECI office helps manage funds and coordination between the partners. ACME is ultimately responsible for overseeing the partnerships in addition to everything that normally comes with being a principal. Industry partners are responsible for providing internship opportunities and exposing the students to various aspects of the industry through school visits, site visits, and facilitating participation in industry competitions. All partners come together to develop and update curriculum based on a combination of what the industry partner states is needed and the state standards. In this way, industry has a substantial amount of influence over the direction and focus of the school. Despite having cooperative partners and an especially supportive college partner, there were still challenges with the partnerships that the school faced.

6.3.3 Institutional Clashes and Constraints

While each P-TECH school faces unique challenges based on various social, cultural, and political factors, one significant challenge and source of anxiety they all encounter in their development is ensuring the corporate partner is going to fulfil their commitments without having any way of holding them accountable. One director I interviewed from the original P-TECH steering committee expressed it this way:

> It's just really hard to get companies in the United States to operate in the way that they do in say Germany or Norway or say Singapore where there's you know deep ties to government, private sector, education, so typically we interface with each company's CSR unit and not necessarily the frontline like in the case of Global Tech, engineers; they would have been corporate relations or community relations or corporate philanthropy or something and that's what we would expect moving forward with any company that we would approach.

In contrast to the previous school's central challenge at an inter-organisation level being with the college partner, ACME's struggles were primarily with the industry partners.

The most prominent challenge expressed by ACME and CUNY educators at an organisational level was getting more opportunities for students through the industry partners.

At one of the planning meetings I attended with members from each of the partners, they were discussing the internship options and a majority of the opportunities came from city-wide industry partners established through NYCDOE and funded through state grants. The program facilitating the majority of ACME's internship opportunities is called PENCIL. PENCIL is a school partnership program that facilitates collaboration between industry and education communities through their three primary programs. The program conducts career readiness training programs leading into several six-week paid internships at a partner company. The remaining internships were left up to the industry liaison who was having difficulty at the time in securing more than a few internships with the company. It was determined that priority would be based on grades and the students' Regents Exams results for both sets of internship opportunities (PENCIL program and the industry partner).

One of the students I spoke to had completed an internship already and said it was a really valuable experience that he hopes will help launch him into a career after college.

> That was great. I made a bunch of connections. It was really cool because the first day the CEO of the 4As had seen me present one time in ninth grade for my Advertising class so my teacher had me present to her in private so she had to watch me present and I guess I made a good impression. These connections are useful for me in the future.
>
> Raul, 11th Grade

When asked how he was selected he said, "Ms. Simpson invites the kids that she feels are most capable and from talking and getting to know us." This particular student was a top performer and has several extended family members that attended prestigious universities whom he said taught him the importance of networking. The students chosen for these internships demonstrated their knowledge of business etiquette when interacting with the teachers through different behaviours such as maintaining eye-contact, strong handshakes, and seeming engaged by nodding throughout discussions with these teachers. Much like the students that were positioned to benefit the most from the P-TECH model at Kettler High School the students excelling at ACME were those that were already relatively well-resourced in terms of cultural capital (Bourdieu, 1986) outside of school. Despite educators at

ACME being critically aware of the distinct socio-political struggles their students face, the fact that students were chosen based on signifiers to indicate that they were capable for these positions is demonstrative of what Bourdieu argues as 'misrecognising' higher levels of cultural capital as talent (Bourdieu, 1996). As a result, such students are rewarded more and thus benefitting more from the model. However, when assessing how beneficial the model is in terms of equity (chapter eight) it is also important to acknowledge the different contextual factors at play. In this case, ACME has more bureaucratic constraints than the other two schools in this study imposed by the NYCDOE.

Related to the issue of obtaining internships through the official industry partner, another challenge expressed was with the lack of mentors. At the time of my fieldwork there were no existing mentorships in place, but the plan was to instate them alongside internships. The industry liaison stated that there were no mentors yet due to a combination of time constraints for the professionals and regulations imposed by the NYCDOE on having the professionals interact with the students. The requirements consisted of fingerprinting and an orientation. Mr Williams stated that the fingerprinting for each professional was seen as too costly and time consuming. In terms of interest, Mr Williams said he had enough professionals willing to volunteer but it was the bureaucratic constraints that were too prohibitive at this point.

I found that Industry roles and responsibilities looked different at each P-TECH school. Other P-TECH principals I spoke with said their industry partners all went through fingerprinting and the orientation but still had issues with establishing a mentor program because of time constraints. At ACME, there was a more obvious physical presence of industry partners in the classes. The liaison would bring in clients to the advertising classes for students to pitch ideas to and receive feedback. They would also come and talk to the students about the different jobs in advertising. The liaison would also organise groups of students to participate in industry-led marketing competitions. While I was there, the students participated in a branding competition called ReACT, where students were challenged with

creating a campaign for Spotify that promotes "togetherness and individuality" for the company's Family Plan. The students were guided in what the process looks like, including research and strategy to a media plan by the industry partner. While these are valuable experiences for the students, the mentor piece was still missing which meant there were few opportunities for students to develop relationships with the industry representatives aside from the few that were chosen for internships. Overall, the industry partners were not as active as they were meant to be at this point due to bureaucratic constraints imposed by the NYCDOE. However, they did play an active role in shaping the curriculum to meet the needs of the industry. In designing the advertising and media courses, the industry liaison would outline specific skills the industry needed, which primarily centred around digital skills such as graphic design and data analytics. In this way, the industry partners are having a direct influence on the direction and goals of the school through curriculum development. However, their influence in terms of the school culture is not so evident. While the absence of mentoring and internship opportunities for all students could certainly offer a partial explanation for the lack of industry-culture throughout the school, given how politically and socially engaged the students and educators are in conjunction with the ideological underpinnings of the model's development it is important to acknowledge this space of agency for the students to shape their school culture. Also informing the school culture are the asymmetric power relations between and within the partnering institutions.

6.4 Organisational challenges and power relations

While New York City schools are subsumed under the NYCDOE they represent two very distinct positions within the partnership. For one, the NYCDOE has legitimate, mandated power over the schools and are ultimately in charge of how funds are distributed. While ACME is the listed partner, the school is under the complete purview of the NYCDOE and constrained by higher level bureaucratic procedures.

It was revealed through discussions with other educators that there was an apparent distrust between teachers at ACME and the NYCDOE which was explained by the school's social worker, Ms Garcia, as a residual effect from the Bloomberg administration. The Bloomberg times were referenced frequently with teachers stating that it was a difficult time for them with the NYCDOE. One of Michael Bloomberg's major campaign promises was to improve the school system. As discussed earlier, his radical intervention entailed closing many "failing" schools and opening small ones then lifting restrictions on where students could attend high school in order to promote school choice. From the teacher's perspectives, this cost them their jobs and created more instability in the system. Notably, Michael Bloomberg's time as mayor coincided with the economic recession so there was already a spike in job loss throughout the NYCDOE. Fuelling the controversial interventions and in line with his commitment to bring more commercial resources into the education system, Bloomberg increased the contracting budget by about $700 million alongside a NYCDOE hiring freeze (Santos, 2011). In my interview with Ms Garcia she discussed the issues from her perspective:

> So I have been in the DOE for 21 years now...so I saw this system from the Board of Education to the Department of Education. I saw it through several chancellors. I saw it through several initiatives, the Common Core and the Danielson framework, so the guidance counsellor or the social worker they always, they were never seen. Things were very difficult during the Bloomberg administration. Many things were not funded and many of our, I think in general the Department of Education was just trying to keep jobs.

Further illustrating the tensions and distrust between these institutions is the way one teacher expressed her reticence to have me observe her classroom saying, "I don't have tenure yet and I don't trust the DOE after all the layoffs. I don't want Dr Allen to know I'm talking to you and it's just too risky". This fear was understandable given the mismatch in interests between teachers and the NYCDOE during the Bloomberg years.

Ultimately, in terms of power relations within the partnership at an organisational level, the NYCDOE has the most control over setting the agenda and development of the

partnerships. However, while the NYCDOE has formal power in shaping the agenda and core curriculum, they themselves are influenced by outside forces. Beyond federal policies, how the NYCDOE governs the city's schools is also influenced by external educational service providers such as national charter management organisations, philanthropic organisations, and technology companies. As the social network analysis (Chapter four) highlighted, the mayor-appointed chancellor system attracted people through ties with both the federal DOE and technology industry. These people were given formal and informal roles within the NYCDOE and consulted with for improving various aspects of the city's schools. One major reform goal resulting from some of these consultant meetings and furthering Bloomberg's market-based policies was the notion of school choice and giving families more options to 'choose' the best schools for their students. This resulted in the new public school sorting system.

6.5 "Choosing" ACME

The process of sorting students into New York City public schools is politically and socially contentious. New York City has some of the most segregated schools in the country (Frankenberg & Lee, 2002). In an attempt to alleviate the growing segregation issues while simultaneously advancing market-based reform initiatives promoted by the city's educational reformers, Michael Bloomberg instated his small school reform initiative that reconfigured the city's public school landscape resulting in a rapid increase in the number of schools and perceived "choices" available to families. This particular market-based intervention is based on the idea that an increase in choices increases consumer power and encourages competition that, if ran according to supposed market-logic, schools would improve in performance. In this case families are treated as consumers and schools are competing to recruit them. This trend has been mirrored at a national level, in part due to No Child Left Behind (NCLB)

policies (Chapter 2) that are informed by similar market-based rationales[10]. On the surface it may seem as if families have more agency in deciding where their student goes to school but the notion of "choice" here is severely limited by the city's sorting process and opaque algorithm used to match students.

At the elementary school level, students attend schools within their school zone. The trend in increasingly racially- and ethnically- segregated neighbourhoods and growing gentrification issues are arguably central factors in shaping the segregation problems within public schools. Controversy surrounding zoning criteria in school admissions has resulted in wealthy families in highly desirable districts to pressure the NYCDOE to tighten zoning criteria in school admissions at the elementary and middle school levels. Some educators at ACME believed that where your child goes for elementary school can have a profound impact on their future. Principal Allen said he and his wife were considering moving out of the city when their children were kindergarten age because of the pressure and lack of control over where their children go to middle school and high school. Unlike elementary schools, many middle schools are not dependent on neighbourhood zones and families can apply to any middle school within their district. While the sorting criteria is not entirely transparent, it is known that many schools consider test-scores and attendance rates in the admissions process. The elementary and middle school process is distinct from the high school sorting process.

Stated as another way to alleviate these growing segregation issues, Michael Bloomberg lifted restrictions on where eighth grade students could apply for high school. Students can now apply to any high school in the city regardless of where they reside. On the application, families rank their top twelve choices and wait to be "matched" by the NYCDOE, that runs an algorithm to sort students. The sorting process has come under more scrutiny recently after city officials announced they are reconsidering admissions policies in order to increase

[10] In order to continue receiving funds, No Child Left Behind requires schools to submit Adequate Yearly Progress (AYP) reports based on state-determined performance targets. Those that fail to meet targets or submit the AYP are phased out of their funds and deemed as failing. The current trends show these schools are being shut down and replaced with charter schools.

diversity within schools. In response, there has been a recent push by a city councilman to make this algorithm public and transparent (Dwyer, 2017).

As part of the high school application process, eighth grade families attend open houses at prospective schools and school fairs where there are many schools in attendance. The purpose of these open houses and school fairs is essentially an opportunity for principals to sell their school. During an interview with another P-TECH principal in the city, I was told that they spent a sizeable amount of money and time putting logos on T-Shirts, bags, hats, and water bottles in order to recruit eighth graders. Some new schools also go door-to-door in their school's neighbourhood in order to promote their school and attract local families. The principal explained their marketing and recruiting strategy by saying:

> In the beginning years we invested more in swag so we branded everything and were giving out free pens and backpacks just to get the logo out there to get people talking. So we advertise widely. We go to all the fairs. We have a lot of different open houses here. We've been revamping our website multiple times. We literally went door-to-door and brought materials. We went to all the public libraries and sent out message blasts to all the middle schools in NYC.

This marketing and branding of schools in order to recruit students is a clear example of the reorientation of education toward corporate practices. Unsurprisingly, P-TECH excelled at this and because of the successful branding at the national level, they have all been over-subscribed to for the last several years. Another P-TECH principal said around 1700 students listed their school as their first choice. The 100 students that receive a place is determined by lottery and the algorithm mentioned above. Ultimately, the only choice families have is in deciding which twelve schools they list as preferences. There is a range of diverse motivations and reasons students choose P-TECH schools.

6.5.1 Motivations for Attending ACME

Students and families were attracted to ACME for several reasons and these differed depending on the student's current grade. Across all grades, the three most pronounced motivations stated by students during interviews included, opportunities with industry, the approachability of Principal Allen, and alignment with future aspirations. Where the

dominant motivation from students at Kettler was free college, New York City students have many early college schools to choose from, which is likely the reason why this was not echoed as much in discussions surrounding motivations with students at ACME.

Students from the legacy class, ACME's first students, stated that they ended up at ACME during the second-round matching process after not being placed in their first-round choices. The following excerpt is from one student interview demonstrating the common sentiment shared amongst students from the legacy class:

Raul: The city puts new schools into a second-round program so in my case I got accepted to a school but I wasn't necessarily like hyped or happy about that placement so I went into the second-round placement and ACME was one of the options.

Interviewer: And why did you want ACME? Was this your only option or did you have other options?

Raul: A majority of the other options were other new schools or there were schools that had empty seats and so it was really just like a bunch of schools that no one wants and a bunch of new schools that people need to take a chance on.

Raul: And so seeing ACME and seeing Dr Allen and Ms Simpson... they stood out I guess from all these other schools that just looked miserable and so the way that they just sold the school to people, people were engaged...and then the two years of college was a plus but it was more of the possibility that I saw in them.

Other students discussed how they were originally disappointed to not be matched with any of their top choices but stated they are happy now. Another third-year student encapsulated what most third year students discussed in their interviews with the following statement:

> Yeah, but I've been fortunate enough, like if I would have to describe the things that have happened in my life it's more of a right place at the right time because coming to ACME wasn't my first choice so being rejected from the school that I originally wanted to go to at the moment felt like the worst thing but then ACME, like I don't see how things could have gone better if I didn't go to ACME. ACME was what I needed to do because ACME is an advertising high school and I discovered my passion for advertising which I wouldn't have discovered if I didn't come here.
>
> Jordan, 11th Grade

A majority of the first and second year students stated their primary motivation for "choosing" ACME was due to their interest in advertising and the business skills they would

be able to develop. Almost every student I spoke with from the ninth and tenth grades stated that they selected ACME based on their future desires to either obtain a well-paying job or study advertising, media, or hospitality in college. Another notable theme that emerged in the context of motivations, primarily with the ninth and tenth grade students, was how desirable ACME was not because of its connection and exposure to industry but rather the district the school belongs to. Some students said they travel over an hour each way from Queens to District Two every day but said it was worth it because of the opportunities and resources there are for students in District Two. In these cases, it was not about the affordances of the P-TECH model or even the advertising focus that drew them to ACME. The patterns found within the range of motivations for attending ACME is encapsulated in the following tenth grade student's response:

> My mom wanted me to be in this district because she thinks I'll get into trouble if I went to one of the schools by us. She also liked the free college part, obviously. For me though, I've always had an interest in television and magazines and advertising is a big part of that. Also, I'm more of a creative person anyway. Not a math person. They also said advertising pays well.
>
> Sophie, 10th Grade

While there was an alignment in terms of interests and future aspirations with the younger grades, there was more variation amongst students in the school's legacy class. Several students stated that they have plans to become doctors and lawyers but expressed concern that the classes they needed for those majors in college were not available to them.

> So for us it's a little more diverse. People want to be lawyers and doctors and plenty of other things and the school tries to find them as many internship opportunities regardless. At one point it was told to us that there was a possibility of taking courses in the other school in the building if our school didn't offer them. Eventually that possibility died out so I know people are frustrated they can't get those classes they need and part of them deciding to come here was because of that possibility.
>
> Raul, 11th Grade

Although these students expressed concerns regarding the availability of classes they also stated that they were satisfied with their placement at ACME and felt the school provided the necessary support and resources for them to achieve their goals after high school. When asked for an example of how these students were supported in terms of their goals, Raul said

that the school paid for a couple of students to go to medical conferences aimed at students wanting to go into medicine.

In sum, students and families chose to list ACME as a preference based on a variety of reasons ranging from the industry-opportunities to the perceived improved resources and life-trajectories of students coming from District Two. The school's legacy class students were placed at ACME in the second round of the matching process after not receiving their top preferences in the first round. Most of these students stated that they were drawn to ACME first by how approachable and enthusiastic Principal Allen was at the open house. Despite not being their initial preferred school, all of the legacy class students I spoke with were pleased with the school. The tenth graders I spoke with said it was a combination of the district reputation and interest in advertising. For ninth graders, their motivations for choosing ACME aligned more directly with the advertising focus of the school and potential career trajectories.

This discussion illustrates the specific cultural struggles and part of the everyday experiences of ACME Tech students as they traverse these politically and socially contentious spaces. It is also meant to contextualise the school further by highlighting important components contributing to the overall school culture. A fundamental point made here is that the school's location and organisational make-up is intertwined with both material and cultural representations of power. Importantly, the school and its students are embedded within greater systems of inclusion and exclusion that is not lost on ACME students and educators.

Given all of this, it is important to remember that ACME was ultimately developed under the umbrella of a STEM-focused school and being aware of the intricacies and challenges entangled in its organisational make-up gives critically important insight in understanding the role technology is playing. The next section provides an outline of the use of technology and

its associated challenges at ACME. It ultimately highlights the importance of culture and how wider political issues influence the role of technology.

6.6 The Role of Tech at ACME

In line with this study's overall examination of the role of technology in the P-TECH model, the assessment of technology's role at ACME is based on the understanding that technology is not a neutral artefact, distinct from the broader political, economic, cultural, and social contexts in which it is produced, distributed, and consumed. With this understanding in mind, particular attention is paid to the interrelationship between the federal and local governments, industry, and the school in analysing the role of technology at ACME. The data presented highlights the overall peripheral role technology plays at ACME despite being resource-rich.

The Federal government's role in governing the nation's public schools is arguably narrow because control over schools primarily lies with the states. However, educational technology policies and the DOE's goals directly influence educational policies and initiatives at the local level. Indeed, while I noted in chapter two that educational technology policies in the US date back to the 1950s, it was these past several administrations that placed an emphasis on the importance of what information and communication technologies and private partnerships can offer the country's schools (Chapter 2).[11] The current administration continues to emphasise STEM education supported through various educational technology initiatives and most recently Donald Trump signed a Memorandum for STEM education funding in September 2017. Building upon Barack Obama's Computer Science for All initiative, the current administration has placed particular emphasis on coding in schools, announcing that companies like Amazon, Facebook, Google, and GM would be consulted in rethinking federal education technology policies to ensure the nation's public schools are equipping students with relevant skills needed for the digital economy (White House, 2017).

While previous administrations have encouraged public schools to depend more on private sector resources to supplement their STEM education, this administration has accelerated this effort in various ways (Chapter 2). All of these broader political initiatives have directly influenced the agenda and goals of the NYCDOE. Given the heightened concern over the ways in which commercial interests are pervading and reshaping the values, structure, and purpose of public education this section highlights the industry partner's role in terms of the purpose, use, and views of technology at the school. The data gathered for ACME relating to technology continues to challenge these narratives of corporate influence at the micro level.

The 2015-2020 Strategic Technology Plan put forth by the NYCDOE states the central vision as "Equity and Excellence for All" where they describe equity meaning every student is given equal support and access to resources (Strategic Technology Plan, 2015). The primary goal outlined in the plan is to increase STEM access to every public school student so that everyone is equipped with the necessary knowledge and skills to pursue post-secondary opportunities in STEM fields. This aligns with the federal DOE initiative and increased investments made to encourage students to pursue STEM careers in order to grow the US economy (Department of Education, 2017). Ultimately, the goals outlined in the NYCDOE Strategic Technology Plan mirror the values and discourses found in the federal educational technology objectives where hopeful idealisations about the transformative powers of technology are evident.

A central argument I make in chapter eight is how technology and related education policies have worked to obscure the underlying structural and political forces shaping perceived educational achievement disparities. While none of the principals I spoke with believed technology acted as an all-encompassing equaliser, Principal Allen was the most aware of the tensions between the need for ubiquitous technological access and skills and the limits of technology in alleviating systemic issues. The following quote comes from one of

our conversations when I asked his thoughts on the enthusiasm surrounding technology and its ability to support improved life prospects for marginalised students:

> I obviously know it isn't the answer. I know it isn't going to fix the issues my students face when they go home every day but I also know they will fall further behind without it and getting the tech they do need is within my power so that's my focus. Making sure my students have the tools they need to succeed. I have to do what I can to make sure the students walking through my doors don't fall further behind.

Indeed, it is known that access to telecommunications services is increasingly assumed as a minimum condition of participation in the 'new economy' with the telecommunications industry as the foundation for Information Technology, new media and financial services (Chakravartty & Sarakikas 2006, p. 51). In addition to being the most aware of these tensions, Principal Allen was also the most successful in obtaining enough up-to-date technological resources out of the three schools I spent time at. There were enough MacBook Air laptops for each student, an expensive option by any measure. Much like Kettler High from the previous chapter, most schools chose Chromebooks but Principal Allen said he had more than enough money from the grants to buy Macbooks and believed they would be more reliable and would not require as many updates or virus protections as the Chromebooks. Every class I visited was equipped with SmartBoards. The state of the art computer lab, known as the MAC lab, had iMacs in contrast to the other schools that primarily used more affordable Dell computers.

The abundance of technological resources was partly attributed to the principal's ability to write successful grant applications through his experience with the NYCDOE before becoming a principal and the grant-writing training he received during his doctoral education. The district's financial resources and commitment to increasing technology and focus on STEM throughout the city's schools is also a factor.

6.6.1 New York City Department of Education Technology Budget

The annual technology budget covering instructional supplies and equipment for all NYCDOE schools is $27 million. (New York City Department of Education, 2016).

However, how this is distributed across schools is not clear. Principal Allen stated that schools are highly dependent on grants for technological resources and they must report any external grants their school has been awarded to the NYCDOE. Given this, it is likely to vary drastically between schools depending on how successful they are with grants.

My time at ACME coincided with the citywide budget deadline where schools are required to submit what they have spent. A couple of days before the deadline, Principal Allen found himself in a position where he had excess funds that he needed to spend quickly because the grants did not allow funds to be rolled over for the next fiscal year. He spent that morning calling teachers in to ask what they needed for their classrooms and students. When asked why there were excess funds he explained he found a deal on the laptops and they did not require the money allotted for maintenance that he originally anticipated.

Despite being resource rich in this way, technology actually played a peripheral role at ACME Tech. Unlike many of the PTECH schools including Kettler, ACME's career focus is not technology-driven. This is not to say that technological skills and access to technological resources are not important to the mission it just is not *the* defining feature of the school. Principal Allen characterises ACME as a STEAM school demonstrating that technology is part of its mission but the central focus was actually on creativity rather than the technology itself. This is supported through the course sequence and in-class use of technology.

6.6.2 Curriculum and In-class Technology Use

As previously discussed, the reorientation towards a market driven curriculum designed to cater to private sector partners has brought about heightened anxiety from critics over the transfer of commercial values and the perceived threats to democracy as a pillar of public education. Also established above is the fact that the industry partners worked with other partners to craft the curriculum for non-core subjects based on industry needs. In this way, the industry partners do have an avenue to embed commercial values and directly shape this

element of public education. However, for various reasons discussed below, this had very little impact in terms of the use, views, and beliefs in technology in the school.

Students are required to take concept courses in their first year before moving on to the next stage of Advertising and Media courses. The first concept course, Visual Thinking Lab I, is where they learn about colour theory, the basics of advertising strategies and the creative process. First year students take Visual Thinking Lab I which does not incorporate technology. During the Visual Thinking Lab I classes I observed the students spent their time doing abstract concept artwork and presenting the connections between colour and associated emotions they illicit. Students created their various projects throughout the month primarily with coloured craft paper, scissors, and glue. The class mimicked a makerspace learning environment with a little more direction. Students were free to use whatever materials were available in the class as long as it was not "technological". When I asked the teacher what the rationale was behind having them do this instead of starting right away with using Adobe Creative Suite she said understanding the fundamentals, developing the conceptual thinking skills, and slowing down the creative process is more important than learning the software. This supports the overall peripheral role technology plays in the school. It also highlights the tensions between technology being a necessary component today but also how its affordances are limited without understanding underlying processes.

The second and third year students take classes using the Adobe Creative Suite in the school's MAC lab. Large iMac desktop computers lined the walls of the class and students were welcome to choose where they sat. While the school did not promote or characterise its pedagogic practices as being unconventional or innovative, this class differed from the rest that I observed in that it mocked a professional setting and teaching responsibilities were often shared between the teacher and students. In this class, clients are brought in to discuss a need they want the students to fulfil then students would get into groups to start working on their pitch for the client. These were real needs the students were competing to fulfil. The

project they were working on while I was there was a campaign called "Every Four Years" which aims to promote young adult voices in the presidential voting process. Students were prompted to come up with marketing strategies and advertisements in order to promote the campaign and recruit eighteen to twenty-five year olds to discuss their political views and rationale behind their voting practices. The students first made mood boards to develop their conceptual maps for their advertisements. They then used Adobe Illustrator on the MAC lab computers to create their advertisements before they ultimately pitched their ideas to the client. Throughout the process over the course of a month there was little discussion surrounding the software being used other than the questions from students about different functionalities. Instead, there were many rich discussions on the role of young people in politics and the expressed frustrations from students about not having their political views being taken seriously. These discussions were supported by the teachers but they were student-led and directed. The industry representatives would not intervene much in the discussions but they did not actively discourage the conversations. Instead, the industry representatives would walk around and discuss strategies and how they were creating their advertisements.

Interestingly, technology seemed to be seen as a tool for delegitimising their political aptitudes. In one class where students were leading what they called "break-out sessions" which were dedicated to discussing a topic of the students' choosing and debating or supporting one another's views, one student expressed his frustration with not having his views being taken seriously which he believed were due to adults' misguided assumptions about their interests in and uses of digital technology. He expressed:

> Adults act like we're just doing nothing all the time on our phones and think that we only care about Facebook or Snapchat or our music. Like what does any of that have to do with having political views? I've got views and I know more about what's going on in the world thanks to my phone and social media. I probably know more about what's going on politically than any adult in my building. Don't tell me I don't know what I'm walking out for.

The student's views were widely supported with other students echoing similar sentiments.

Technology use in the school's core classes were very similar to Kettler High from the previous chapter except ACME did not utilise the popular Bring Your Own Device approach and did not implement a loan scheme for laptops because it was perceived as too risky for the NYCDOE. For the standard classes such as History, Algebra, and English, the students would use the laptops often for research during their classes but little else. The most prominent and favoured technological resource used in the classroom was Google Drive. One history teacher I spoke with described the primary uses and affordances as follows:

> One of the biggest things I think has revolutionised the school in general is Google Drive. Being able to create a Google Doc and access it wherever you want so you know when you use laptops in your classes, which we have laptop carts that bounce from class to class, nobody has to say anything like 'I don't have a flash drive or a computer' you can just Google Doc/Drive. So that's a huge thing for us and we also put all of our curriculum onto Google Drive and share with all of the students so they can access every PowerPoint and get any assignment that they're missing.
>
> Mr. Crothers, History Teacher

In the previous chapter, I discussed how the use of Google Classroom and Google Drive is becoming standardised across the country's primary and secondary schools. I also noted how this informed the identity of the school. Despite also using Google Classroom in most of ACME's classes, the school does not self-identify as a "Google school" or an "Apple school" based on the technology usage in this way. While it was apparent how partners such as IBM and Google are governing and structuring the previous school through their technology, this was not the case at ACME.

Ironically, and despite having enough devices and resources at the school, barriers to ubiquitous access for students limited their affordances. The following discussion on these challenges solidifies the peripheral role and perception of technology at ACME. While there was general consensus among ACME educators that technology was not the solution to systemic inequalities, it was widely acknowledged that technology was a necessary component of the equation for solutions to the exacerbation of inequalities.

6.6.3 Digital Disconnects

In the beginning of the year many ACME teachers ask students to fill out surveys that include questions on the type of access and technological resources they have at home. Unsurprisingly, many students do not have reliable Internet access at home and a large portion of the students do not have computers.

> This has been a struggle for us and it will be a struggle for me next year is that all students are required to have email through Gmail which is great but some students do not have cell phones and some students do not have computers at home. Next year because they'll be on the college campus they'll have access to computer labs which is okay but I will say that one thing I've had to change about my style of teaching is that I often gave a lot of homework assignments that are computer based and I have not done that the last two years because they just don't have the access.

Other teachers try to mediate the issue by only assigning work that requires computer and Internet access for long-term projects so they could have more time to make arrangements in order to access the computer lab at ACME, which is not always available because classes are ran in there, or the ones on the partner college's campus. One English teacher explained,

> And if there were times that we did give them assignments that required computer access they are long-term projects like a term paper or if it was a project where they had to use PowerPoint then they were given multiple days so they could access the computer lab after school.

In line with the overall shared political and social awareness influencing ACME's politically charged culture, another teacher touched on the underlying issues beyond access to technology at school.

> This is something that is part of my curriculum for next year for Government Economics but one of the biggest parts of wealth inequality is access to technology and resources when they're kids. Somebody that grows up with wealth has the best schools, tutoring, the best technology at home so you can have computers and technology and everything, they go to good schools and college because they were able to get tutors for SATs and everything else whereas kids in poverty may not even have a computer at home...or electricity to read from a book. I think it (technology) will be another determinant for new generations, but it definitely exacerbates the situation not having it. It's a hard balance to strike...yes, access is part of it but let's not lose sight of everything else they need to catch up.

There are several points this teacher made that warrant further reflection. This teacher grew up in a working-class family and initially dropped out of high school because of personal hardships and lack of resources to overcome them. He eventually finished and now has a

master's degree from an Ivy League institution. Before coming to ACME he taught at the city's most coveted and competitive public high school until he said he felt the need to give back and serve the population he grew up with. In his class, he often encouraged discussions about the unique barriers ACME students face and would always look for ways to incorporate them into his lessons. He has an understanding that technology is not an equaliser but access and skills are necessary to not fall further behind. This awareness was pervasive throughout the school. The tensions underpinning their understanding of the need for these resources so they can keep up and be competitive after school but also that ICTs are merely one component of the overall system of inequality is demonstrative of the role and perception of technology at ACME.

Ultimately, while the school has plenty of technological resources, technology was not as central to the school's mission and aims as one might assume given the aim and origin of the model. This is partly due to the fact that the industry focus is not information technology like many of the other PTECH schools but also because of the educators' acute awareness that there are deeper issues to address that are larger determinants of a student's success than technology. Aligning with both the federal and NYCDOE technology initiatives, during interviews, educators emphasised that they are committed to providing the necessary technological resources and equipping students with relevant skills for today's economy so they do not fall further behind. However, they were much more concerned about providing the critical social support their students need to perform well. Despite the direct commercial involvement in the classrooms and helping to curate the curricula by identifying the technological skills necessary for the students to be competitive, these social and cultural factors were more powerful in determining the role and view of technology in the school.

In line with a dominant argument throughout this study is that there was clear consensus at ACME that technology does have the potential to help provide certain opportunities that can have a great social impact such as gaining proper technological skills that can allow these

students to obtain IT related jobs. However, it is equally understood that technology is not the answer to existing inequalities and that unless these structural issues causing the inequities in the first place are addressed then the perpetuation of these inequities will continue. This directly aligns with what Warschauer (2003) argues when promoting a social inclusion approach to digital inequalities.

> As researchers of ICT and its social context, we may sometimes tally up computers and Internet accounts; however, this is not an end in itself but rather part of a broader effort to better understand the process of technology use and the role of ICT in human and social development. Similarly, as social advocates, we may work to distribute computer equipment, but again as one step toward a larger purpose of helping people participate fully in the information economy and network society (2003, p. 216).

In sum, technology is seen as a necessary resource but it does not have the potential to transcend the underlying issues of poverty and other forms of inequality affecting ACME students. Technology is useful for ACME students to develop relevant skills for the advertising industry such as graphic design and data analytics. The ability to fully realise these affordances were limited due to a lack of ubiquitous and reliable access to the resources outside of school. Importantly, the technology was not central to the school's culture like it was at the previous school. Various factors influenced this including the social and political context the school and its students are situated within. Another variable is the fact that the school's industry focus is not strictly technical like the Information Technology and engineering P-TECH schools. Certainly, institutional bureaucratic and logistical constraints that worked to limit industry engagement where perhaps technology might be made more central is also a factor. Despite the abundance in technological resources and the industry's involvement in shaping the curriculum, the culture of ACME and the peripheral role of technology was primarily defined by the students' positionalities and particular struggles they faced navigating broader social contexts in their everyday lives.

6.7 Conclusion

The core purpose of this chapter has been to provide necessary context-specific details about ACME in terms of its geographic, political, social, and cultural makeup. Beyond providing important and valuable technical skills needed for careers in advertising such as graphic design, technology played a minor role in terms of the school's impact on inequality. Despite having plenty of technological resources in the school, access outside of school still proved to be an issue. Like the other schools, this challenge with lack of ubiquitous and reliable access meant teachers needed to adjust their requirements for assignments or students would fall behind. Overall, there was widespread acknowledgment of the limited role technology plays in alleviating the issues the students face. The key takeaway from my time at ACME in terms of technology is that any discussion about the role of technological resources and policies shaping schools like P-TECH cannot be separated from more important considerations of the systems of power they are embedded in.

The shaping of curriculum and goals by industry partners is an instantiation of control that has resulted from broader political, economic and social processes further propelled by digital capitalism. As previously established (chapter 2), these processes include the devolution of state in public education coupled with an increased dependency on private resources due to budget crises and discourses surrounding global competitiveness fueled by the technology sector. However, warding against an essentialising critical assessment rendering students and other actors as passive and subservient (contrary to arguments from Althusser (1971) and Bowles and Gintis [1976]), at the micro-level, students, with support from educators enabling the dialogues, took it upon themselves to consistently discuss political and social issues which was more meaningful in defining the school's culture rather than the overbearing commercial influence seen at the other schools. It was surprising, given the city's extensive history with public private partnerships and being where the P-TECH model was first developed and implemented, that the commercial influence was not as apparent as it was at the other schools. Where the industry focus pervaded nearly every facet

of the other schools I visited, the culture of ACME was defined more by an acute social awareness amongst educators and students along with a recognition of the instrumental nature of technology. Therefore, despite the lessening of barriers and promotion of private sector involvement in public education, certain cultural factors may serve as forces of resistance to the corporate control enabled by digital capitalism that Schiller (1999) warns about.

Ultimately, it was found that students with already elevated levels of cultural capital were benefiting the most from the model at ACME. Students that succeeded in obtaining internship opportunities did so by having an understanding of business etiquette and networking practices. At the time of my visit, there were not enough internships for all students, so it is possible that once they obtain more internships through their partners that this benefit will be more equitable. The industry partners benefit the most from the partnership as they are directly shaping and choosing their future employees. They can ensure teachers are teaching the skills they outlined as necessary and scout for their future employees at the school. It will likely be those same students obtaining the internships that are chosen for these jobs. In this way, the model is achieving its aim but only for a minority of the students.

What this all leads to is a P-TECH school that is bound up within a complex set of reconfigured power relations and despite their best efforts, schools are not able to surpass all of the other constraints such as performance pressures and requirements placed upon them and their students along with the deep issues these students face. Ultimately, student outcomes are still mapping along traditional lines of inequality. ACME is a particularly valuable site to tease out the tensions at both macro- and micro-level analyses of these technology-driven public private partnerships. It clearly highlights the complexities of commercial involvement in public education and that a simple celebratory or critical account will not be useful in advancing more equitable education policies.

Chapter 7 C&C Academy

While the United States is not likely to become the same manufacturing force it was in the 1950s and 1960s, there has been renewed excitement from financial advisors, investment firms, and government surrounding the presumed "American industrial renaissance". The U.S. Bureau of Labor characterises the manufacturing sector as establishments comprising of "plants, factories, or mills...and use power-driven machines and materials-handling equipment" (U.S. Bureau of Labor Statistics, 2017). Two central factors considered when touting the potential growth from the US manufacturing market includes the increasingly competitive manufacturing wages and job opportunities (McCormack, 2009). In 2014 there were nearly 300,000 newly open job opportunities in manufacturing (U.S. Bureau of Labor Statistics, 2014). In the beginning of 2018, the president and CEO of the National Association of Manufacturers boasted that the Trump administration's tax reform bill "represents historic progress for manufacturers and for all Americans" he continued his praise by stating that manufacturers will "increase capital spending, expand their businesses and hire more workers" (Minter, 2018).

Manufacturing encompasses a wide-range of industries but currently there is a particular interest in construction, presumably promulgated by this administration's focus and investment on infrastructure. Notably, the employment of construction labourers has the highest projected growth for all occupations with 12 per cent from 2016-2026 (Bureau of Labour Statistics, 2016). According to the U.S. Bureau of Economic Analysis, construction as an industry has seen a steady increase in terms of its gross output since 2011 (Bureau of Economic Analysis, 2017). Given this, together with P-TECH's drive to help grow both local and national economies and close the perceived skills gaps between industries and education, it is not surprising to find a growing constituency of construction-focused P-TECH schools. The third and final school included in this embedded case study is one of these construction schools.

Character and Construction Academy (C&C), located in the Southwestern region of the US, is a construction and manufacturing focused P-TECH charter school. It was one of P-TECH's newest schools during the time of my field work, having opened less than a year before I arrived. Aside from it being a charter school, C&C stands out from other P-TECH schools in many ways from its location, organisational structure, culture, ties with military, and attitudes toward technology and higher education. Through these distinct features, C&C is the site that illuminates the co-constitutive nature of political economy and the everyday most. The purpose of the chapter is to highlight this relationship by contextualising the organisational structure within the charter school movement. It begins with a brief overview of this movement before moving on to the site profile where the culture of C&C is discussed in terms of its working-class, or "all-American" values. This is followed by an in-depth discussion on the role of technology at C&C and the parallels between the educators' overwhelmingly cynical views regarding technology and higher education.

I argue that the P-TECH model here acts as more of a vehicle to advance the country's educational priorities, from the decreased government involvement and responsibilities to industry-driven education goals, rather than actively informing the shape and goals of C&C like the other two schools. A defining belief held by all educators and students at C&C is that there needs to be a change in the public's perception of the value of higher education and accept multiple pathways. This is something that is strongly promoted by P-TECH as well.

7.1 School choice and the charter school movement

> In an economy where knowledge is our most valuable asset, a good education is no longer just a pathway to opportunity -- it is an imperative. Our children only get one chance at an education, and charter schools demonstrate what is possible when States, communities, teachers, parents, and students work together.
>
> President Barack Obama, 2012

The above quote comes from former President Barack Obama's proclamation for establishing National Charter School Week in 2012. Although the expansion of charter schools and increasingly associated with the current administration's Secretary of Education,

Betsy DeVos, who is known for her charter school advocacy work, it is important to note that charter schools have generated support across the political spectrum. There has been a push for them has been in motion since the early 1990s. They are at the centre of the school choice movement. In line with this free-market ideology, "...the promotion of choice is a key tenet of neoliberal education policy" (Fiske & Ladd, 2000). However, when assessing the policy rhetoric and the underlying views, the discourse across advocates becomes polarised and maps more neatly along party lines. Liberal advocates tout charter schools as sites of innovative and individualised pedagogy. They also believe that it opens up opportunities for those in lesser resourced areas to attend more resourced schools out of their zip code. Conservative charter school proponents believe that providing parents more choices will increase competition in the education market resulting in higher quality teaching and education. As such, an ideological polarisation is clear. Despite evidence to the contrary, advocates of charter schools across the political spectrum promote the idea that charter schools would alleviate inequalities in the education system for all of the reasons listed above (Timpane, Brewer, Gill, & Ross, 2001; Ravitch, 2010).

Charter schools were first introduced in the early 1990s in Minnesota. Charter schools are recognised as public schools that operate independently from the local school district. They receive public funding but may also raise private funds. Charter schools have more autonomy than traditional public schools in terms of their budgets, teaching contracts and requirements, academic calendar, and curriculum. They also determine their length of days and school year. However, like all public schools, charter schools must remain tuition-free and meet basic state academic requirements. Critics have concerns about the lack of accountability and regulations regarding the quality of teaching (Bulkley & Fisler, 2003; Ravitch, 2010, 2016).

Today, there are nearly 7 thousand charters schools across the country. Over 3 million students in the US attend charter schools (National Alliance for Public Charters, 2017). The diffusion of charter schools across the country has been uneven. Currently, 44 states plus the

District of Columbia have charter school laws. There are restrictions on how many charter schools are allowed in the state. The political climate and related school choice environment are notable factors influencing their uneven adoption.

Charter schools encompass a wide-range of diverse approaches but they are all mission-oriented. C&C Academy is a branch of an already well-established charter school system in the state. It encompasses an elementary school, middle school, and high school. It is a nationally recognised charter school group and known for its "College Kindergarten". The schools in this charter school group are college-preparatory charter schools meaning they prepare students for tertiary education. C&C was established for students its educators characterise as more "physically inclined," and do not "fit the mould" for traditional education models. It is a vocationally-oriented school meant to prepare students for immediate entry into the labour market.

7.2 Character and Construction Academy Profile

C&C Academy is a construction and advanced manufacturing-focused P-TECH charter school located in what I will to refer to as "Mountain State" which is in the Southwest region of the US. Interestingly, the educators, including the principal, were not too familiar with P-TECH beyond the model and unlike the educators at the previous schools, C&C educators had little interest in the network. The principal explained that he proposed the construction-oriented charter school and one district finally approved it but required that it follow the P-TECH model. Principal Robinson explained, "After [the district] agreed to the charter they're the ones who made the P-TECH a requirement and I had never heard of it." Although he had never heard of P-TECH prior to this, he was fully supportive of it and believed it provided the credibility needed to be accepted more widely.

The school opened in the fall of 2016 with 160 students. When I arrived, there were 250 students. Aside from representing the charter school version of the P-TECH model, C&C is organisationally distinct because it did not begin with just one grade and 100 students per

grade. When it opened it had students in grades six through ten. This shows another way it is distinct in that it serves grades six through fourteen instead of the usual twelve to fourteen supporting its view of providing alternative pathways from a younger age. When I arrived, there were ten students in the eleventh grade. Additionally, instead of integrating the college courses throughout high school, C&C has students earning certifications in various areas like traditional trade schools until they have completed grade twelve. They then have students move on to the community college for their associate's degrees. C&C also differentiates itself from the others beyond its organisational structure. The school's geography, demographics, cultural associations, worldviews, and orientations all distinguish C&C from the others.

7.2.1 Military and Religious influence

The city where C&C is located is the second largest city in the state. Its economy is primarily driven by the military and high-tech industry with the military making up nearly 50 per cent of it. It is home to several major military bases split between the US Air Force and the Army. Interestingly, the city is also home to national headquarters for various Evangelical Christian organisations. Indeed, the city is mostly known nationally as a hub for Christian fundamentalism and the military. This is important to note because both the military and religion play vital roles in informing the culture and values of C&C. Notably, the school's core values of integrity, honestly, respect, responsibility, excellence, and work ethic closely align with those espoused in the military. The core values of the United States Air Force are "integrity first, service before self, and excellence in all we do" (U.S. Air Force Doctrine, 2015). Additionally, in terms of the broader implications, the relationship between Christianity, especially Protestantism, and capitalism has been well documented dating back to Weber's (1930) *The Protestant Ethic and the Spirit of Capitalism*. Here, Weber discusses how the values espoused by the Protestant religion, particularly work ethic, helped lay the foundation for modern capitalism. While C&C is not aiming to be overtly capitalistic, this is important to note because it illustrates an instance where culture is a reification of the

political economy. Relating this more directly to C&C where, as this chapter discusses, physical labour is valued over academic pursuits, it is made clear how the military, religion, and the current political economic context is influenced and maintained through cultural forces.

Walking up to C&C, the first thing that caught my eye was that the school is housed in a repurposed church. I found out during my tour of the school that the church still operates out of the building on Sundays and the pastor lives in a house overlooking the school just across the street. The principal knew the pastor from his church community and several teachers mentioned that they went to the same church as other teachers. One teacher was a pastor himself and retired from the Air Force like several other teachers at C&C. Several of C&C's teachers are military veterans and many of the students have parents that are currently serving in the military. Lining the hallways outside of each classroom are students' camouflage backpacks and their toolboxes. These ties and influences from both the military and religion are embedded into the organisational and cultural fabric of the school. Some key insights emerge regarding the consequences of P-TECH and its ideological underpinnings when these are assessed together with the predominantly working class values espoused by students and educators along with the broader neoliberal education agenda that P-TECH is situated within.

7.2.2. Partnerships: Not so unlikely pairs

During my time at C&C, the industry partnerships and their specific roles were still being developed but a few were in place. The primary industry partner while I was there was the city's housing and building association and a solar panel company that had recently joined. Given what is now known about the city where C&C is located, it is unsurprising to find that partnerships with the military were also being forged. The local airport has recently been chosen as the place where heads of state planes, such as Air Force One, and other federal government aircrafts will now be built. However, there was concern regarding a lack of specifically skilled and certified labourers to fulfil the positions needed to help build them.

The principal used this state of affairs to work with the airport to secure several million dollars from the governor of Mountain State to implement an Airframe and/or Powerplant (A&P) program at C&C's partnering community college to train and certify its students so they could be "funneled" into those jobs.

Similar to the lack of awareness of P-TECH, teachers and students were not familiar with the partnerships or the specific responsibilities of the industry partners. Ms Elliot, one of the science teachers, stated:

> I know at some point there is going to be some sort of builder for commercial and government airliners coming in so I know about them. I know we're going to try and help funnel some of our kids that way and other than that there's one construction company and one solar panel company.

Similarly, Alejandro, an eleventh grade student, explained his understanding of the partnerships this way:

> I know we are supposed to pick a track to follow for the community college and we have partners that will help us get jobs but I don't really know. We do a monthly P-TECH Connect thing to meet people and we've practiced interview skills and things like that.

In terms of the industry partnership responsibilities, Principal Robinson explained:

> Their responsibilities will be mentoring. Once a month we have partners come in and then students break into groups and they actually go and meet with the employers. The objective is they learn first-hand what the job really looks like, what the pay looks like, the job requirements but we also want them to have the experience of interviewing and learning how to interact with their future bosses.

During my time there, the industry partners were not playing an obvious role but the school was also in its early stages so it will be important to assess their overall influence once the partnerships are more established and the school has evolved. However, important insight can still be drawn based on these entanglements and ties between the school and the military. Assessing the interactions between the state, industry, and school for the other sites in this embedded case study were straightforward because the demarcations were clearer. This is not the case with C&C where it is difficult to disentangle the military and commercial influences. For example, the military, a state-run enterprise, is reliant on industry for research and

development and technology while the defence industry is reliant upon government for funding. As detailed in chapter two, the relationship with military, industry, and higher education is extensive but never before have these been embedded in or had direct influence on the K-12 system until now.

7.2.3 Organisational and financial structure

Organisationally, the structure and partnership responsibilities are more relaxed than they were at the other P-TECH schools. Part of this could be attributed to the lesser oversight charter schools have. The community college partners were supportive and enthusiastic about establishing the new A&P program to help train the C&C students for expected jobs at the airport. C&C did not face the same logistical issues that Kettler and ACME did in terms of the college courses because they were not planning on integrating the courses in the high school at all. Instead, students would complete high school then go on to the community college for their associate's like most other community college students across the country. The students still choose tracks based on specific majors offered by the community college. The tracks they can choose from include: machining, welding technology, carpentry, plumbing, and electrical. They will be able to choose A&P once the program is implemented at C&C. The current degree offerings from the community college partner for C&C students include associates degrees in machining, architectural engineering, construction management, HVAC, and Computer Aided Design. More options will also be added in the coming years as the programs grow.

Charter school funding works slightly different than traditional public schools. While they are still funded according to enrolment and receive public funds on a per pupil basis, they do not receive the same capital funds to support their facilities. As detailed above, charter schools may also sometimes receive private funds but overall, they are less funded than public schools. The average cost per pupil in Mountain State is around seven thousand dollars and this is what C&C receives as well. The curriculum is paid for out of their per

pupil revenue whereas most public schools dedicate those funds to salaries. As such, teacher salaries are much lower at C&C than they would be if they taught at public schools. Importantly, teachers at charter schools are not required to be certified so a majority of C&C's teachers do not have certifications in teaching and are less experienced overall.

C&C has built their woodworking and welding shops and resources from donations and grants. They have one person whose position is dedicated purely to grant seeking. Principal Robinson said he posts weekly wish-lists for the school on Facebook and have found the community to be very supportive. He said that the father of a former student of his when he was a teacher in the community gave them all of the furniture because he owned a furniture store in the city. The machines in the shop were donated by local companies that he and some teachers had connections to. This community component is important to the overall mission of C&C as well and is demonstrated through the school's character education and core values.

7.2.4 Demographics

Throughout the development stages and its first few years of operation, P-TECH organisers were centrally concerned with creating a model that catered specifically to underrepresented groups. While this is still a goal of the model, the discourse has shifted to include all students everywhere. C&C Academy represents this shift in that the student population is predominantly white and while a majority come from working-class backgrounds, they do span the socioeconomic spectrum. The student demographics closely reflect both the state and city demographics where about 80 per cent of its residents are white, 15 per cent are Hispanic or Latino, and 7 per cent are Black or African American (U.S. Census Bureau, 2016).

Similar to other P-TECH schools, C&C is male dominated. However, C&C has the most striking imbalance with over 80 per cent of its students being male. This is not surprising given the gendered perceptions of these particular trades. Gender was not as prominent of a

theme as I initially suspected. I spent a substantial amount of time talking with the female students and all but one expressed that they were generally unbothered by it and stated that they felt special being one among the few that were there. This could have been because it was perhaps difficult for them to say otherwise. One of the older girls in tenth grade did say it was challenging because she felt she had to do more in the shops to earn respect from the boys and legitimise her place at the school. What was more pronounced were the teachers' issues with the male-dominated student body and the culture they felt it bred. Several teachers said they believed the school was more chaotic because boys are more energetic in general. Ms Hall, an English and history teacher who has a son at the school said she was concerned about the influence this was having on her son. She explained, "Like 90% of our students are male, I have noticed that my son has become much more rough and tumble and we've got some machismo that he wasn't displaying before." Those attitudes toward students' behaviours were always qualified by saying "they're boys. It's what boys do!" All educators that referenced this imbalance stated that the school was particularly suited to serve boys because they can get their energy and frustration out through building things and using the tools.

7.2.5 Politics of character: character first, academics later

The core values of C&C are: honesty, integrity, respect, responsibility, excellence, and work ethic. These are displayed various places throughout the school. They are inscribed on the stairs (Figure 7.1), framed and hanging up downstairs by the shop classes and upstairs in the common area.



Figure 7.1 The school's core values inscribed on the stairs.

On my first day at C&C I signed in and was escorted to meet Principal Robinson who gave me a tour of the school. He first emphasised right away that C&C is a school of character and that work ethic is important but it comes second. He repeatedly mentioned to myself and the students that "Hitler had excellent work ethic but bad character" to reinforce the importance of character. The following quote is an excerpt from the school's website that reads:

> Work ethic and discipline are extremely important to being successful in today's workforce. The student discipline code is stricter than traditional schools. Students will speak to peers, school staff, and members of the community with respect. The use of "Mr.", "Ms.", "Sir", and "Ma'am" is common language at C&C.

Each student I was introduced to stood straight up, made eye-contact, and gave me a firm handshake. I noticed that there was a strict dress code enforced. Each day students were checked for belts, dark denim blue jeans, and ironed tucked in school-branded polo-style shirts. There were also regulations on hair styles and colour stating that students' hair must be a "natural" colour. While not entirely unusual in charter schools, these extensive codes of conduct and dress code regulations have been marked as ways to police youth and create

compliant subjects. At C&C these codes of conduct are entangled with class-based values that are also influenced by a strong military presence. None of this is surprising given the historical progression of public education. Historically, public schools were aiming to prepare students for future citizenship but the roles have increasingly become intellectual and economically-focused (Fraser, 2001). In the contemporary US K-12 education system, we continue to have this increasing division between the intellectual and the economic, which is reproduced at C&C through its micro-political contexts discussed below. These issues are discussed in-depth in the following sections.

7.3 The embodiment of class at C&C

The purpose of outlining the various components making up the site profile of C&C such as its demographics, dedication to character education, military, religious and geographical influences is to highlight how layered the meaning of class (and subsequent class values) truly is. Reducing determinants to economic factors would be misguided and reductive. Many definitions of working class are also flawed if they restrict its meaning to education level on its own while not considering some highly educated individuals might have low paying occupations because of slow job growth. This also precludes individuals that have not gained a bachelor's degree but are working high-paying jobs while self-identifying as upper middle class. Indeed, conceptualisations of the American working class vary and are often contested. Characteristics often associated with the working class include those without a college degree and commonly employed in retail and manual labour occupations (Holzer, 2018). The understanding put forth here focuses on the manual labour, goods-producing industrial occupations because of C&C's aims. Even more important than specific occupational groupings though, the conceptualisation of working class utilised takes more seriously the values and cultural associations often connected to the American working class such as obedience, community, work ethic, and respect for authority (Montgomery, 1980). While C&C students might span the socioeconomic spectrum, due, in part, to the concentration of

military families, they all share similar worldviews and orientations often influenced by their parents' backgrounds.

7.3.1 "We're not white or blue, we're new collar"

In many ways, class was a defining feature of the school's culture and influence on the students. One of the most striking statements made during my time at C&C came from one of the teachers who exclaimed, "We're not white or blue, we're new collar". When I asked what that meant he said that current understandings of class were too rigid for society today and that they miss those in between that were not quite high tech but could learn and ultimately have marketable skills for jobs "in the middle". Interestingly, IBM's CEO Ginni Rometty is credited with coining the term "new collar" and P-TECH has recently adopted it, as it has appeared on several articles they have released on their website. The idea behind 'new collar' is not the same as "new-class theory" that posits there has been an advent of another class composed of knowledge workers (Berger, 1986). Instead, as briefly discussed in Chapter 5, new collar refers to 'middle-skill' technology jobs in every sector ranging from agriculture to cybersecurity. IBM's conception of new collar occupations are this generation's functional equivalent to what data entry jobs were when computers first entered the workplace. The creation of the term came after recognising the challenges for job seekers in both "white collar" tech-jobs and non-tech "blue collar" industries and it encompasses jobs in burgeoning sectors of the economy that are unfulfilled but should not require traditional college degrees (Crozier, 2018). What qualifies as middle-skills is not clearly defined. It is used rather to refer to the jobs associated with middle-skills instead of explicitly outlining what the skills are.

While C&C is not preparing students for the types of jobs IBM is currently promoting as new collar, the ideological underpinning is what makes this most relevant to C&C. Ginni Rometty stated that the qualifying characteristics of new collar jobs is that relevant skills should be obtained through vocational training rather than four-year degrees (Johnson &

Weller, 2017). This represents the broader aim of IBM, through the P-TECH model, to devalue four-year degrees. It has been made clear throughout this study thus far that school is increasingly vocational- and market-based. This serves to intensify this process and further advance the justification for increased private sector involvement in public education by having companies shape curricula according to their needs in exchange for potential job opportunities for all students. The key takeaway is that IBM's support to curb an increasingly credential-based society through its promotion of "new collar jobs" that do not require more than a two-year associate's degree, positions the company (through its P-TECH model) to benefit the most. While this is discussed in detail in the next chapter, it is critical to note that these benefits are not merely profit-based. Rather, the benefits include IBM's ability to influence society's agenda. In terms of their implementation of the new collar campaign, the promotion of valuing and hiring based on skills over credentials that lies at the heart of this movement aligns with the views and beliefs held by C&C educators and students toward education. This has deep class implications.

7.3.2 Learning to labour in the 21st century

In Paul Willis' (1977) canonical book, *Learning to Labour,* he illustrates the particular importance of a cultural perspective in an evaluation of how structure and agency are co-constitutive. In his argument about how working class youth get working class jobs he highlights the active acts of resistance taken by the group of students he follows, thus challenging notions of working class students simply being passive victims of socialisation. This is not to say that schools are not actively participating in social reproduction practices but that the processes behind social reproduction are more complex. These processes involve both structural pressures and the ways in which class is embodied. What the different P-TECH schools (and C&C in particular) make apparent is how students of different social classes are still being educated differently for different functions in society. Vocationally oriented schools like C&C tend to attract a higher concentration of students from working

class backgrounds (National Center for Education Statistics, 1992). The philosophy underpinning early vocational education is that it would prepare students for their probable careers.

In the case of C&C it would be easy to believe that the students are there simply because they have a sincere interest in the industrial trades. While I believe many of the students do have this genuine interest, that interest is informed by the students' backgrounds, exposure to these trades through their families, and further propelled by the values espoused throughout the school. When asked why they were interested in pursuing construction, the dominant response was that it came from being exposed to it at home and through their parents or grandparents. Andrew, a tenth-grade student, explained that building decks and homes with his grandfather that informed his interests in construction. A ninth-grade student, Alicia, explained that her interest in plumbing is driven partially by her religion, which encourages serving others, but also by helping her dad around the house and watching him at work. These encapsulate the majority of the students' responses regarding their interests.

As demonstrated at Kettler, interests being inspired through exposure from parents is not unique to those interested in the industrial trades but what differentiates C&C students from those at Kettler is how these interests are entangled with strong class values that are perpetuated at home and at the school. Many of the students explained that these jobs are about serving others, community, dedication, and work ethic, which maps closely with both the school's key values and working class values outlined above. Because charter schools have less oversight and are mission-driven, there is more opportunity for the transfer and promotion of values. It is here that the concept of institutional habitus becomes relevant at C&C. As a reminder, institutional habitus is meant as "…an intervening variable, providing a 'semi-autonomous' means by which class, raced and gendered processes are played out in the lives of students…" (Reay et al, 2001, p.2). The way these processes are played out in the lives of students at C&C is through the specific cultural group discussed thus far. Through

this, I argue the school itself embodies a working class habitus with its own class predispositions.

Class backgrounds are reinforced through institutional habitus. At C&C, this is done through organisational practices such as the strict dress code, modes of discipline, its character education, and the curriculum. The strict code of conduct is deeply tied to class perceptions where working class students are more chaotic and need more control. These strict codes of conduct are internalised by the students. Other studies have documented this trend and disparity across schools based on class where they have found more forms of silencing and control (Parsons; 1959; Tyak, 1974; Morris, 2005; Kuchik, 2009). The focus on character also aligns with the school's primary principle and is a reflection of working class values as described earlier. Another way in which these values and class predispositions are made apparent at C&C is through teachers' evaluations of students, students' own perceptions of their abilities and interests, and both student and educator attitudes toward the education system.

7.3.3 Intellectual versus physical inclinations

The way educators assess student characteristics such as their aptitude to learn and overall behaviour is a micro-political process which has meaningful implications in terms of cultural-educational resources (Roscigno et al. 1999, p. 164). Previous studies have confirmed associations between educators' evaluation of students' abilities and class (Rist, 1970; Diamond, Randolph & Spillane, 2008). Some have argued that lower income and working class students are often described in deficit-based language such as being "disruptive" or "lacking self-control and discipline". It is important to be critical of distinctions such as intellectual and physical because terms such as 'intellectualism' are the products of a cultural construction that results in favouring and legitimising middle class behaviour and pursuits over others. While the principal and some teachers explained their biggest challenge at C&C were getting their students motivated to learn and behave properly, most educators presented

their evaluations in positive, asset-based language. Teachers would often describe the students as being "energetic and excitable" or when discussing their struggle to have students concentrate they would explain that their minds and hearts were in the shops and students were just "eager to go downstairs".

Regardless of how they presented their evaluations of students, all educators justified their behavioural assessments by saying their students needed movement and hands-on learning. In line with this, both students and educators believed that the students were simply "physical people" with "physical inclinations". This was commonly discussed in the contexts of future trajectories and attitudes toward the education system, which were also class-based. The following quote by Mr Lee encapsulates all of this:

> I do think that there are people that are academic minded and there are people that, I won't use blue collar and white collar but in essence, right, physical. I do think we need to recognise that college is flooded with people that shouldn't be there and that's why we have that problem. We need to realise that we can be successful without college, we need to continue education just not in a formal school setting.

Many of the students reiterated this sentiment in terms of what they like about the school and their views toward higher education. For example, Alex (9th grade) said, "I like that it focuses on real world physical stuff. I need that. I'm a physical learner." In their interviews and discussions throughout my time at C&C, both the educators and students challenged generalised status-mapping. Many students expressed frustration with working-class connotations. One eighth grade student expressed: "People all like to think they're better than blue collar but really, I don't even like to say blue collar." Other students and teachers expressed similar sentiments in this context. Mr Jameson, one of the shop teachers, stated, "at least we make $35 an hour with as many hours as we want". Similarly, a tenth-grade student named George, further supported the division between intellectual and physical, placing intellectuals in the technology camp, by stating, "I can't wait for the day these computers and machines fail people and they come to us to do the job they can't because college didn't prepare them for the real world." This quote also highlights a further distinction made that

positions the students further from technology. This division between physical and technological inclinations is discussed below.

This distinction between physical and intellectual ultimately highlights another way class has been embodied at C&C, which is internalised and expressed by the students and educators as a disenchantment and overall critical view of the education system. There was a strong sense among the students and educators that the educational system was not designed for them. In order to convey this sentiment, one teacher referred to C&C students as "octagon kids, not box kids" that fit neatly in the traditional education system. Both teachers and students explicitly expressed their disappointment with the school system arguing that a one-size-fits-all education system only serves a small subset of the population that is able to sit still and succeed with rote learning. As such, one common explanation for why students chose C&C is that they had negative experiences in traditional settings where standardised testing is prioritised and there is little movement in the classroom.

Accompanying their expressed motivations for attending C&C was the fact that they were not interested in pursuing a four-year degree which further exemplified their distaste for the education system. Andrew (10th grade) stated, "My theory is in the trade I'm going for college isn't necessary so if I don't have to go then I'm not going." Another student, Seth, in the eleventh grade said, "Well my dad never went to college and he owns two businesses." Overall, it seemed that students felt they occupied an undervalued position in school and in society more broadly, especially in the context of an ever-growing technology-centred global economy. This relates to Willis' argument that working class youth view credential-based education as having little value or relevance for them considering their trade-based pursuits (Willis, 1977). In some ways, this also supports his argument that students *consciously* dissociate themselves with school, rather than being forced down that path, and actively pursue alternative routes.

These negative views toward higher education among the working class, particularly for men, is not a new finding and has been well documented (Bene, 1959; Cloward & Jones, 1962; Willis, 1977; Archer, Hollingworth, and Halsall, 2007; Ingram, 2009). Socially constructed conceptions of masculinity and work, family background, and the undervaluing of vocational learning have all been attributed to informing these negative beliefs that are being supported at C&C through its institutional habitus (McGivney, 1999; Marks, 2003). In many ways, these instances of class embodiment at C&C show how the school reflects the students' class values and also maintains it.

The varied ways in which class is embodied at C&C highlights the importance of culture and how the cultural components are both informing and informed by more macro structures. IBM's new collar campaign is an exemplar. At the macro level there is IBM's attempt through its new-collar campaign to reshape education pathways by encouraging students to obtain associate's degrees instead of four-year degrees. This calculated move is based on several factors, such as the desire to close the skills gap between what is being taught and company needs and students from non-middle or upper-class families that do not have the resources or desire to pursue a four-year degree. The consequences of this affect the structural level by disrupting the education system and advancing private interests and influences at an earlier stage (high school). It also has significant consequences at the micro level that deserve a critical lens. While it is admirable to provide various pathways to arguably more stable and lucrative jobs for those that might not otherwise have them, careful attention must be paid to ensure that class divisions are not being further polarised by priming students for their 'probable careers'. This is why it is particularly important to recognise and assess both the political economy and culture in the dialect of reproduction.

7.4 Technology at C&C

The views and beliefs about technology held by educators and students at C&C align with the dominant themes outlined throughout this chapter including a person's natural

inclinations expressed as the idea that not everyone is "technologically-minded". People interested in technology were juxtaposed again to those that are more "physically inclined". There was also an overwhelming distrust of technology and a belief that there is too much dependency and value placed on technology. Overall, technology was seen as overvalued by society and threatening "fundamental skills" needed to keep society running.

Many have written about the decline in the quality of life among working class Americans as the economy has deindustrialised. Industrial jobs have become increasingly insecure as factories continue shutting down and relocating overseas, and more opportunities are requiring digital skills leaving many industrial workers feeling left behind. Notably, this is cited as one of the primary reasons Donald Trump won the presidential election. The rhetoric used on the campaign trail was catered to these members of the working class[12] by promising to invest in infrastructure and bring back their manufacturing jobs. While those in major metropolitan areas continue to benefit from the technological revolution, this large swath of the population in America's heartland feel the resulting knowledge-based economy (Castells, 1996; 2009) has edged them out and left them disenfranchised. As such, those identifying with blue-collar, working class values and experiences do not view technology the same way as those living where technology and innovation equate to more opportunity. When analysing the Pew Research Center's data on the demographics of device ownership and Internet penetration (Anderson, 2015) alongside voting patterns from the electoral voting map, a correlation between lower incomes, technology access, and voting makes itself clear. If someone were to do a cultural analysis and map class values of voters, regardless of income, the correlation would likely still hold given that industrial workers, whose jobs have a wide range for earning potential, were ignited by Donald Trump's promises to bring back manufacturing. All of this is important to understanding the role of technology at C&C

[12] It is important to note that these references to the working class in the context of the 2016 presidential election has been focused on a subset of the working class—often referring to white male workers in construction, mining, and goods-producing industries. The US working class is increasingly more diverse than this.

because it provides an explanation for why there were overwhelmingly cynical views and pervasive distrust expressed by the educators and students toward technology.

While there may be this belief that technology threatened their jobs and that technology is overvalued in society, I would not classify these educators and students as luddites because that is just one of many variables informing their attitudes toward technology. They were not anti-technology overall. Many of the teachers and students did have smartphones and computers of their own. They did acknowledge technology's purpose, place, and promises in society and construction industries, albeit with a much more tempered view. Instead, aligning with what has been argued thus far, many cultural, political and economic variables influence people's attitudes toward technology. The data for C&C regarding technology provides a more nuanced understanding of this as well as technology's role within the P-TECH network.

7.4.1 Technological resources and in-class use at C&C

C&C stands in stark contrast to the current of STEM-focused schools, including a majority of the P-TECH schools. Because the school is not centrally concerned with STEM and aims to equip its students with the skills needed primarily for low-tech construction jobs it is not surprising that the technological resources at C&C were minimal. Rather than striving to be a one-to-one school, the school's technological resources include one computer lab where the younger students take their keyboarding class and a couple of 3D printers with computers in their Computer Aided Design and Drafting (AutoCAD) class.

The school was still under construction during my time there but the principal told me they were currently awaiting approval from the state to install their computer numeric control (CNC) machines[13]. Despite having cleared the regulations, the principal said the state was challenging them and standing in the way of them implementing the machines because he said the state changed the regulations and they currently did not meet the new requirements. He said they hope to have all of the shops completed with the CNC machines by the next

[13] A computer numeric control (CNC) is a tool that is used for prototyping and full production for cutting, carving, and machining (Rogers, 2015).

year. During my time at the school, the three shops were equipped with welding machines and several band saw machines.

In terms of regulations on personal devices, the students are not allowed to have their phones on them unless a teacher has said to bring them in for a class exercise. Aside from teachers showing video clips and occasionally using PowerPoint, the only other use of technology in the core classes was when students had earned a class game activity in math. There were several class periods where the teachers played math games from the Kahoot website that required students to use their phones. Not all students have phones so teachers would have the students split into groups of five and make sure at least one student per group had access to a smartphone.

Ultimately, the keyboarding class and their AutoCAD class are the students' main exposure to technology at the school. In their keyboarding class, the students learn about PowerPoint, Microsoft Word, how to write an email, and play keyboarding games to strengthen their typing skills. The AutoCAD class has about twenty computers and a couple of 3D printers. In AutoCAD, students learn how to create models and drawings for various industries. The students worked on photo realistic rendering of geometric shapes and how to create a blueprint. Students were enthusiastic about this class and were proud of their creations. During my time there, the students were working on designing doorstops and lighting covers for the school. By the end of the month the students were helping Mr Montoya with the blueprints for the tiny house they were going to build.

The AutoCAD class was always referenced when I asked about the school not prioritising technology. Indeed, AutoCAD enables the technical expertise needed to pursue various fields from architecture to interior design. As such, all of the students I spoke with believed that there was a healthy balance of technology at the school because they had AutoCAD. Alicia, a ninth-grader expressed it this way:

> Well it's alright. I mean there's a little less emphasis on some of them core technical things like computers...but they do make up for it in CAD and I think it's a little balanced.

When asked about their thoughts on schools that use laptops in each class every student voiced concerns about the fear of increased dependency and disruption to learning. This is quite different from the students at Kettler that praised technology's ability to aid in their learning. Ashley, a ninth-grade C&C student echoed the sentiment that some technology is useful as long as there was a balance.

> I think some technology is good. Like our CAD class, that's good. I don't think having iPads or laptops would be the best idea because they are too distracting and no one would learn anything.

Ashley had an interesting relationship with technology. She does not have a phone or a computer and has no interest in them. She feels that technology can be useful but ultimately views it as a hindrance on her freedom. When I asked how her parents get in touch with her without a phone she said, "they don't". She further explained that several of her friends do not have phones and people made it a long time without needing them so she does not understand why it is seen as a big deal to not be without them now. In response to me asking her how she feels about not having a phone she expressed:

> I think my parents will want me to have one when I start driving at 18 but I like not being glued to a phone. I can entertain myself and actually enjoy my friends. Why would anyone want their parents attached to them at all times? Let us be with our friends and *really* be with them.

This sentiment was shared more widely among the students. It challenges the homogenising narrative that all teenagers in this generation are glued to their phones, thus supporting the need for more context-based research and the importance of utilising a cultural lens.

Principal Robinson felt that technology ultimately does the students a disservice by making work too easy. He explained his philosophy on technology this way:

> I'm very old school I guess is the best way to describe it. I don't let the kids use calculators. I just think it's a waste of time. That would be like having a translator in your Spanish class. It doesn't make any sense. So, there is something to be said for learning things the real way, the hard way.

As demonstrated throughout the chapter thus far, disentangling these views from the cultural associations and orientations is not possible. These mostly sceptical or cynical views toward technology are deeply entangled with the students' and educators' worldviews and values informed by their cultural associations and standpoints. As the introduction of this subsection laid out, there was a broad distrust of technology entwined with views that it is a threat in various ways.

7.4.2 Distrust and the threat of tech

As noted above, people's dispositions toward technology result from an amalgamation of factors such as class, gender, and historical processes like the one outlined in the introduction of this subsection. As such, technological attitudes and dispositions should not be regarded as simple and one-dimensional. Given the extensive history of technology disrupting old orders of society and dismantling certain sectors of the economy it is understandable how those not profiting and being left behind with little security would develop a sense of distrust and view technology as threatening. The educators and students at C&C belong to this group. Several educators found themselves at C&C after losing their factory jobs and moving back home. Others were military veterans that felt they were not made for or trained for high-tech jobs. Again, many students at C&C were part of these same military families and predominantly had parents working industrial or construction jobs.

When I asked each of the teachers and students if they felt they were missing out by not having much engagement with technology at the school, a majority of the students and teachers responded with a resounding "no". Three of the teachers I asked said that they did not feel the students were missing out but did feel they, themselves, were missing out on technological resources that could make their jobs easier. The physics teacher, who is among these three, stood out as the only teacher at the school that expressed the desire to incorporate more technology into her class. Ms Taylor, the ninth- through eleventh-grade English teacher, characterised the school, as it relates to technology, as a 1940s classroom. She stated,

"There's no tech anywhere. This school system is very classical education. Think of the 1940s classroom. That's how they run it". Mr Lee, an astrology and math teacher, did not see the value of technology in school and believed that even if they had the resources they would not be used. He said, "I don't think that they're missing out because it's not here in the classroom. Schools put in smartboards everywhere. How many teachers use them?"

Despite being aware of the students' backgrounds and cultural associations, it was still surprising to find that they expressed similar views about technology. Students I spoke with, formally and informally, said they did not see the purpose of technology at school. However, some students did express concern about not being equipped for "the real world" in this way. Alejandro, an eleventh-grade student who is an avid gamer, was one of the few that expressed a desire for more engagement with technology and this concern about the need for it after school. He expressed:

> I wish I could have learned more about computers but that can happen at other times because I feel like nowadays you need an education in technology to get far but no, I don't really feel like I'm missing out on anything.

Even though they ultimately feel that technology does more harm than good, the principal along with a few of the teachers, did admit that the students may be lacking useful digital skills once they graduate. This was always justified by stating that these can be learned on their own and it is not critically important for their career paths. When asked about growing pressures to equip students with digital skills the principal claimed:

> They're probably missing out on that to an extent, but this isn't for students that want tech jobs or jobs that require a lot of tech skills. I think that if that's their career path they should probably be at a different school.

This was echoed by Mr Jameson, one of the shop teachers, when he discussed his similar views regarding the overvaluation of technology. He stated:

> I don't think anybody that's building a building needs it. If they want to know that stuff that's fine but it's not necessary to their skillset. A doctor? Maybe. I have no need to worry about technology. Most of these kids are going into construction they don't need it.

Other teachers stated that they did think students were going to need those skills regardless, but that they would be able to learn those on the job. This exposes an interesting clash with the overwhelming belief at the school that C&C is better than traditional schools because they will be better prepared with "real world skills". However, the conclusion to be drawn here is that the school is preparing students for specific trades with particular skills needed for those and that does not involve digital skills.

All in all, teachers and educators at C&C view technology as offering little and threatening much. Students believed it hindered their social skills and was a tool of distraction in terms of their learning. Several students expressed concerns about losing out on what they believed to be fundamental skills such as hand writing, memorisation, concentration, and professional etiquette. Seth, a tenth-grade student who has most apparently internalised the professional behaviour and communication skills being taught, expressed his view this way:

> I believe it has a purpose and a part of education but also I'm finding more and more the common skills such as penmanship and writing or being able to take notes very easily by hand is being lost due to a dependence on technology.

These concerns were echoed by the teachers as well. Several of the teachers said they have the students read reports on how technology is weakening their motor skills and sense of discipline. For example, Mrs Hall expressed her concerns by saying:

> I think if we demand that kids do everything electronically, we're really doing them a disservice in hand-eye coordination, in physical movement, in their ability to focus over long periods; their ability to lose themselves in the work.

Another dominant concern relating to the threat of technology that was frequently discussed by both students and educators is how the perceived dependence on technology is dangerous for the functioning of society. Students would often proclaim that they would be some of the few in this generation that could keep everything moving when the "fancy machines" broke down. Students and educators would promote the value in being able to

build and fix everything from buildings to cars "the old-fashioned way" in case there was a "real Y2K".

The final dominant concern surrounding the threat of technology had to do with professional etiquette. The threat to professional etiquette was a particularly interesting belief and was appropriate for P-TECH considering its aim to equip students with the knowledge and behavioural skills needed for the business world. While the sentiment was shared and expressed by the principal and several teachers, Mrs Taylor, one of the school's history and English teachers, expressed the shared concern most succinctly when she stated:

> A complaint we get from employers is that you've gotta give me someone who isn't going to be on their phone every two minutes. If we're using one-to-one tech in the classroom, how are we supporting that? How are we supporting that complaint from employers that all their young employees do is check their email, play on their phones, surf the web.

Several educators stated how C&C students will have an advantage on the labour market by being trained to put away their phones and look up from a screen. Similar tensions as demonstrated at ACME make themselves apparent here. Again, at C&C there is this understanding, at least among the students, that digital skills are needed in some sense on the labour market, regardless of their chosen occupation, as evidenced by Alejandro's quote, but there is also an acknowledgement of technology's limitations.

7.4.3 Digital Disconnects?

Several teachers believed that the students were not missing out by not having technology in the school because they said the students make up for it on their own time. For instance, Mr Jones, the keyboarding teacher said, "I don't think that it's a gigantic gap because of how much they get in their personal lives too." What is interesting about this is that they also said they could not integrate technology effectively because many students did not have access to a computer or the Internet and there would be too much time needed to train students on basic digital skills.

Andrew, a tenth-grade student who recently transferred to C&C from a nearby public school, said he is glad the school does not have a technology focus or pressure for them to learn it. Like many of the students I spent time with, he said he is not interested and does not see why he needs to be. When asked about what devices he uses at home and if he uses social media he responded, “I'm not really big in technology. I don't really know how to use it. I've never been around it, I guess.” Confirming this disconnect, Mr Montoya stated, “Not everyone can afford a computer and not everyone’s computer is high quality enough to run AutoCAD”. Like the teachers at ACME and Kettler, Mr Montoya adjusted his requirements for the classes by not assigning homework that required a computer or the Internet. Instead, he offers take-home quizzes as homework and encourages the students to spend their study hall periods to catch up on their AutoCAD projects. Other teachers said they give students an option to type assignments, particularly for the ones coming from a homeschool background, but it is not a requirement because not every student has a computer or access to the Internet.

Ultimately, similar to the challenges faced at Kettler and ACME, many C&C students did not have reliable or ubiquitous access to computers or the Internet at home. What was different at C&C in this regard was that the lack of access had little to no impact on the teaching or organisation of the school. Because the school doesn’t privilege STEM or think highly of technology in general, the lack of access outside of the school simply was not perceived as an issue.

7.4.4 Digital versus physical capabilities and aptitudes

There was also the perpetuation of the troublesome binary presented as physical versus intellectual inclinations in the context of technology at C&C. Those interested and skilled in technology were ascribed to the intellectually-inclined camp. The following quote from Mr Jameson, encapsulates the shared view best:

> Everyone has their own skillsets. Not everyone is good at working with phones or computers and that’s just the way it is. I’m a physical person. I have my brain stuff that I like but tech isn’t one of them. I like history and I like saws.

When students and educators discussed this division, it became clear that there was a privileging of the physical and an arguable disparagement toward IT skills and fields. Much of this seemed to be in response to the heightened pressures to become increasingly more credentialed, the overt promotion of technology, and lack of acceptance for multiple pathways in society.

Tying in the views expressed earlier about higher education in the context of people's natural inclinations, there were many similar discussions about the overvaluation of technology. In response to my question about the increased focus on technology and the importance of technical skills on the labour market Mr Montoya exclaimed:

> In recent times the focus has been so much on academics that we're missing the skilled trades and they're always going to be needed in some level. You can learn to do IT work but who's making the computer case? Who is making the building? Who is making the table that the computer case is on? Anything you see around you, that's not natural in anyway and is designed by somebody so to say that that's going out is kind of a bold statement.

While this is certainly true, this excerpt provides another instance in which technology is seen as a threat. Much like the conclusions drawn in the discussion on physical versus intellectual inclinations or academic routes versus the trades, technology is viewed as overvalued.

This physical or digital inclination distinction in the broader context of P-TECH is particularly enlightening. When considering the purpose of this embedded case study was to encapsulate the boundaries of the P-TECH model, then C&C comes to represents the edge of its boundaries in terms of its structure, organisation, and aims. In trying to understand the consequences of the P-TECH model within the US K-12 education system, C&C illuminated the need to look beyond IBM's promotion of technology. While this is discussed in depth in the next chapter, it is important to note that by broadening the scope and moving the role of technology within the P-TECH model out of the centre it becomes evident that the goals are not simply to grow the technology sector but rather to advance industry interests at large by placing them in the centre of public education.

Even though technology occupied a unique place at C&C in terms of the beliefs held and the limited engagement with it, the same conclusion can be drawn from observations at C&C regarding their views on technology's position in society: technology is not the benevolent force providing opportunity for everyone that it was posited to be. Noted throughout the thesis and dating back to the original digital divide literature, it is already understood that access to ICTs, specifically the Internet, and digital skills is increasingly important for economic opportunities. Understanding this makes it unsurprising to find that the attitudes and beliefs toward technology among educators and students at C&C were overwhelmingly cynical. As demonstrated at C&C, technology continues to be seen as a threat and its value overstated. The dispositions toward technology by educators and students at C&C were informed by an array of cultural, economic, and political factors.

7.5 Conclusion

Character and Construction Academy most clearly represents the co-constitutive relationship between the political economy and the everyday. It does this while also highlighting the critical importance of a cultural perspective in this research. This is further supported by Paul Willis (1977) when he claimed, "It is in the passage through the cultural level that aspects of the real structural relationships of society are transformed into conceptual relationships and back again (p.174). To be sure, the cultural is a necessary dialectic of reproduction.

Examples of the relationship between the political economy and the everyday were laid out throughout the chapter beginning with C&C being a charter school to the educators and students' views and orientations toward technology. I argued that charter schools are an integral step within the broader neoliberal education agenda to further the commodification of public education by characterising public education as a system failure and a crippling economic burden on society. It was highlighted that because charter schools have a founding purpose, the value system, informed by the community's concentration of religion, military,

and working class values, is embedded in the institution then projected on and transferred to its students through its institutional habitus. These values are reinforced through the codes of conduct, curriculum, and culture of the school. Indeed, it was made clear how institutional habitus is a central feature of a school's micropolitical contexts where beliefs and expectations flow. Micropolitical contexts are the everyday interactions where sense making takes place (Lareau & Horvat, 1999).

The sort of "naturalism" of future trajectories that do not involve a four-year degree or highly technical careers is related to what Willis (1977) frames as the systematic suppression of life chances. The cynical views toward education were expressed as an implied irrelevance for their future summarising their beliefs that education does not guarantee a career so it is pointless. These views are maintained by the school's own institutional habitus through the same organisationally embedded expectations as demonstrated by its structure.

From a political economy perspective, the chapter covered how IBM's new-collar campaign can be argued as the company's attempt to further shift the structure of education by promoting a system in which their own model has been set up to serve. It is the case that university education may not be appropriate for all and it is helpful to be critical of this dominant view. However, in doing so, all education stakeholders must be critically aware of unconscious biases and be careful of unintended consequences that may categorise and further polarise students based on class where they are increasingly being educated based on 'probable' careers. There is also a need to be critical of who is shaping this, the values informing it, and who it benefits. As one of the main contributions of this thesis, the last chapter engages with this through the policy recommendations put forth. What all of this exemplifies is how everyday choices and actions by schools may contribute to perpetuating existing inequalities or promote social transformation. These actions and beliefs at the everyday level are not captured by a political economy lens but, as this chapter has

demonstrated, the political economy helps to inform these beliefs, worldviews, and orientations which influences these everyday actions.

As one of the stated aims behind the sampling procedures for this embedded case study was to understand the boundaries of the P-TECH model, C&C demonstrated that the consequences of the P-TECH model are more complex and extensive than previously imagined. While the focus of this research is on the role the tech industry is playing in terms of the restructuring of the US K-12 public education system, this does not mean the consequences are strictly related to technology itself. C&C presents itself as a low-tech school primarily training students for low-tech occupations. In my analysis I asked, why would IBM and their P-TECH model be appropriate or interested in a construction school? It was not immediately clear that the tech sector had anything to do with C&C. As detailed above, the principal was not even familiar with P-TECH and saw it as a convenient model that would garner the school more money for the additional two years while students could earn an associate's degree for free. Also, the promotion of STEM, the primary focus and initial reason behind the creation of P-TECH is seen as a barrier for schools like C&C to thrive because more resources are being dedicated to STEM initiatives.

It is worth noting that, out of the three sites in this embedded case study, Kettler was the only one that had an explicit technology career focus further supporting my argument that IBM is more concerned about seeding the K-12 market than promoting the opportunities and promises of technology. As I will discuss in the next chapter, technology and narratives around the digital divide have provided IBM an entrance into the K-12 market allowing them to shape it according to their overall goals. This is akin to venture philanthropists looking for social returns on their investment. What is different with IBM is that they have essentially produced a roadmap through their P-TECH model for other companies to reap some of the same benefits the cohort of philanthropists such as Bill and Melinda Gates, the Walton Foundation, and the Chan-Zuckerberg Initiative, but without having to contribute financially.

Considering all of this, it has become clear that the P-TECH model is powerfully ideological. In this way, P-TECH represents the private sector and the government's desire to increase the corporatisation of education.

Chapter 8 Findings and Discussion

The three sites covered in this embedded case study provided context-rich accounts of the unique dimensions of P-TECH situated within the contemporary IT-industry led corporatisation of education. The purpose of this chapter is to synthesise the findings according to the study's research questions while engaging with the subsequent theoretical and policy implications. It accomplishes this by connecting the data presented from Chapters 4-7 with the threads of theory presented in Chapter 2. The findings are used to further contextualise P-TECH within the current corporatisation of education trends which help generalise the implications of the increased technology sector's role in public education.

The purpose of the embedded case study was to develop an understanding of the boundaries of the P-TECH model while identifying the shared characteristics and differences between the sites. The data chapters focused on providing rich contextual information to help develop a deep understanding of each site and the overall P-TECH network. The data presented in each chapter provided important insight needed to address the study's research theme and aspects of each research question. The study's findings ultimately illuminate the cultural transformations and political-economic processes behind P-TECH in the context of the contemporary corporate-reform movement that is reshaping the US K-12 education system.

As noted throughout this thesis, the research questions are:

1. How are the values and interests underlying the P-TECH model influencing the K-12 system today?

2. What are the consequences of P-TECH's promulgation for its stakeholders and the K-12 system?

3. How does the P-TECH model shape student's identity and career aspirations?

Additionally, the overarching aim was to gain an understanding of how the P-TECH model is impacting existing inequalities. The chapter is structured around answering each research question with attention drawn to this overarching aim. Notably, the questions are organised by scale from the macro to the micro. The first question addresses P-TECH as it is situated within the overall US K-12 education system. The second research question focuses on the model at the network level. The final research question addresses the micro-level by focusing on the model's influence on the students.

8.1 Situating the P-TECH model within the K-12 system

> Higher education had been brought into communion with business, and educational practice was made subject thereby to a loose corporate hegemony. Thick with enterprisers, the governing boards that set university policy insisted that the functions performed by their faculty cater broadly to business demands. Curricula were adjusted in light of labor-market needs; scientific research of long-range import for business growth became a fixture. Corporate employers garnered access to legions of skilled technical and white-collar workers, also heavily subsidized. (Schiller, 1999, p. 146)

The above excerpt from Dan Schiller's (1999) *Digital Capitalism* highlights the trends resulting from the corporatisation of education but can just as easily be used to define the structure and goals of P-TECH. This becomes a particularly appropriate illustration of the impact of digital capitalism, through the proliferation of information technologies, in increasing the process of eroding the distinction between education and business. In order to fully understand how P-TECH is situated within the K-12 education system, what has enabled it to grow, and what the implications are, it is necessary to unpack the values and interests underlying both the model and those shaping the K-12 system. As such, the first research question guiding this study is: How are the values and interests underlying the P-TECH model influencing the K-12 system today? The goal of this question was to develop an understanding of what political, economic, social, and cultural forces enabled a model like P-TECH to not just exist but to rapidly expand. In turn, an understanding of the ways in which

P-TECH is now influencing the K-12 system provides the ability to theorise what the implications of the model might be on a structural level.

While all of the data chapters contained important information that contribute to answering this question it is Chapter 4, the social network analysis (SNA), that contained most of the insights needed. Specifically, Chapter 4 illuminated how there were key interpersonal ties formed between high profile government officials and those from IBM representing the further blurring of public and private spheres that Schiller (1999) argues is being accelerated by digital capitalism. By analysing the SNA findings in the context of digital capitalism, this chapter demonstrates how prominent technology sector actors such as Sam Palmisano and by extension, actors like Bill Gates have come to obtain an undue influence on a public good such as education.

Chapter 4 also highlighted how prominent technology sector actors occupy privileged positions in policymaking spaces through the interrelationship between the state and technology industry. It became apparent through the analysis how digital capitalism can be used as an explanatory mechanism that has helped to condition the context in which P-TECH operates within the current K-12 system. Through the social network analysis, alongside an understanding of digital capitalism, I argue that while technology companies' interests in education are ultimately profit-motivated, an important and often less emphasised benefit for these companies is their accumulation of political influence as well. Indeed, as Chapters 5 and 7 briefly discuss, IBM, through its P-TECH model and new collar campaign, is marketising education and driving both supply and demand. This is then extended to outline the implications for the US K-12 education system today which include technology companies shaping education policy, marketising education, furthering the move toward a complete vocationalisation of education by shaping the curriculum, and subsequently redefining the value and purpose of education.

In order to fully answer this first research question, this section starts with a brief reminder of the thesis and characteristics of digital capitalism. Next, the historical values of education and those underpinning the corporate reform movement are discussed. It then outlines the values and interests underlying P-TECH and other techno-venture-philanthropy endeavours in education before comparing them to both the traditional education values and those of the corporate reform movement. This lays the groundwork for discussing how the values and interests underlying P-TECH are influencing the K-12 system and the subsequent implications mentioned above.

8.1.2 Synthesis of digital capitalism

Digital capitalism is best characterised as the merging of a capitalist market economy with digital network technology. A question that encapsulates the thesis of digital capitalism is: what happens when public interests and goods become commercial objectives while the Internet and other ICTs transform social structures around a digital economy? As a reminder, the thesis of digital capitalism is that the Internet, originally created by the military-industrial complex to serve the public, has transformed to mainly serving corporate interests. Digital capitalism in education is represented through the increased technology sector control over education and the acceleration of the processes of privatisation and vocationalisation. In his discussion regarding the workings of digital capitalism in education, Schiller asserts, "Where once had existed relatively autonomous instructional and learning processes, increasingly, there were now attempts to cater more directly to labor markets" (Schiller, 1999, p. 144). This quote captures the primary consequence of digital capitalism and education.

The growing prevalence and dependency on ICTs throughout institutions and homes alongside a fiscal crisis and the pressure to equip students with 21st century skills set the stage for networked educational markets to arise. Digital capitalism has encouraged a generalised process of institutional change affecting the internal organisations of schools and the design and delivery of education. Information and communication technologies alongside digital

capitalism have opened new entry points for commercial interests in public institutions. Digital capitalism evolved out of market-opening policies and businesses across all sectors of the digital economy are in a constant struggle to maintain those policies and widen the scope of ICT profit projects.

A key point to remember when assessing the workings of digital capitalism in the education domain is that it emerged during a time where education was already awash in change. Digital capitalism has energised the change in educational content and its delivery. In conjunction with the overlaying of ICTs in education, digital capitalism has ultimately worked to accelerate the reorientation of education toward commercial interests.

This is not to say that schools and students do not benefit at all from these partnerships. Indeed, they do and these benefits are discussed in the following section. In a time where public education is being fiscally squeezed the private sector offers valuable resources especially for schools struggling for basic resources. As is the case with P-TECH, industry may also help students accumulate social and cultural capital through their direct involvement in schools. However, these benefits are strikingly limited compared to those private actors enjoy. The distribution of benefits is heavily skewed toward industry while raising important questions about the lack of funding support from the state in order to create a more equal society. This is partially explained by the conflicting interests between public and private spheres. In order to understand these conflicts in the context of education, it is necessary to outline the different values and interests of each. This is done below through an examination of the shift in values and aims of education from before the corporatisation of education movement to the contemporary corporate reform landscape.

8.1.2 From traditional education values to corporate reform values

This research has demonstrated how the values of education have transformed from aligning closely with egalitarian and democratic norms to a system primarily intended to serve the needs of corporations through the rise of the corporate reform movement. I argue

that P-TECH, as a new phase of the corporate reform movement, demonstrates how the values of education are still economic-based but are now beginning to specifically serve the information technology sector. In order to distinguish the values and interests underlying P-TECH in the current technocratic corporate reform landscape from those in the past it is worth providing a brief outline of each.

Education has historically been valued for its democratic development and the creation of an informed citizenry. Dedicating much of his work to ideas of democracy and social reform, philosopher and educator John Dewey (1916) believed that the best means of promoting human interests derived from informed and engaged citizens within a democratic society. Education was not regarded merely as a place to acquire content knowledge, but also self-actualisation and the utilisation of skills for the greater good of society (Dewey, 1897). Traditional values of education were less about predetermined skills-based learning and more about social change. Dewey proclaims:

> "...education is a regulation of the process of coming to share in the social consciousness; and that the adjustment of individual activity on the basis of this social consciousness is the only sure method of social reconstruction" (Dewey, 1897, p. 15).

This emphasis on the value of education to bring about social change and strengthen democracy has eroded with the emergence of the corporate reform movement. It has been made clear throughout this thesis how the value and purpose of education is to primarily serve commercial needs as evidenced by the increased vocationalisation of education. Indeed, as discussed in Chapter 5, the two industry liaisons from Kettler said that one of the biggest benefits of the model for them is how they are able to train potential employees with the skills they specifically need by helping to write the curriculum. It is important to note, while traditional educational values emphasised education's democratic potential, educational values and subsequent goals were never completely divorced from economic uplift in modern education. Horace Mann, the foremost American education reformer who dedicated himself to promoting universal public education, believed that schools can instil the necessary

discipline students need for future employment. He believed in public education's ability to bring about social progress and also reduce class conflicts. However, K-12 public education catering to the needs of the market and being organised by commercial interests is uniquely attributed to the corporate reform agenda.

The foundational value underpinning the corporate reform movement is a faith in market mechanisms to solve all problems. Freedom from government regulations is a solution on its own. Corporate reformers believe that the challenges facing public education can be remedied simply by applying the principles of economics with appropriate rewards to incentivise educators and students and sanctions for poor academic performance. However, the ideological underpinning of the corporate reform movement is antagonistic to public education.

Corporate reformers view the primary purpose of education in economic terms where students are viewed as consumers and the goal is to equip students with the relevant skills necessary to acquire a job while fulfilling industry needs. This stands in contrast to the traditional values and purpose of education that centred on the promotion of producing a democratic and informed citizenry. Corporate reformers carry the belief that government is ill-equipped to oversee education in an efficient and effective manner. Another example illustrating the antagonistic aims and ideologies is the corporate reform agenda's goal to eliminate teachers' unions. Corporate reformers see unions as impeding market goals. For instance, labour unions bring about increased regulatory burdens for corporations. Unions are also seen by corporate reform advocates as unnecessary financial burdens that inflate labour costs. What happens though is that by taking away educators' job protections, academic freedom becomes limited. Additionally, public voice and interests are minimised. The high-stakes testing as an accountability mechanism has undermined professionalism and encouraged educators to teach according to the test.

Amid declining state support, government officials and policymakers have argued for the need for schools to operate according to market-driven principles while encouraging schools to seek partnerships with industry for resources and to create more career-driven educational programming (Patrinos & Sosale, 2007). Just this year, the current administration has proposed combining the Department of Labor and the Department of Education as part of a large government overhaul aligning with its commitment to improve the skills gap between industry needs and education (Ganim, Summers, Marsh, & Kessler, 2018). This alignment and further collapsing of public and private institutions is emblematic of the corporate reform movement. Productivity, accountability, vocationalisation, and data-driven decision making are the dominant trends of the corporate reform movement. The education corporate reform movement is ultimately marked by the shift in the value of education toward a complete economic mission where the purpose of education is to provide a pathway to specific careers.

8.1.3 The values and interests shaping P-TECH

In order to theorise the ways in which the values and interests underpinning P-TECH are influencing the K-12 education system, the competing agendas and vested interests must first be evaluated. Unveiling these interests and agendas makes the goals and motivations behind these reform movements clear and helps in garnering an understanding of the broader influences at work. I have argued that P-TECH is situated within a new phase of the corporate reform movement in which technology companies are at the forefront of influence and control, what I have been referring to throughout this thesis as the technocratic corporate reform movement. The underlying values and interests of this phase of the corporate reform movement are the same as those that shape the P-TECH model. What separates this current phase though is that the initiatives are shaped by the Silicon Valley ethos including the privileging of disruption over sustainability, rapid knowledge diffusion, innovation, idealism, and individualism, (Rao, 2013; Levina & Hasinoff, 2016). As such, the values of technocratic corporate reform can best be understood as a combination of the well-

established corporate reform values outlined above with the addition of the Silicon Valley ethos.

P-TECH values can be decoded through their stated mission and aims along with the discourse throughout the news articles and press releases published by IBM. While the model is presented as mutually beneficial, the P-TECH model is driven by the value of vocationalisation of education, a trend that overwhelmingly benefits corporate actors. This is evidenced by its commitment to meeting industry needs through the curriculum and the central focus on workplace skills as made clear in the presentation of data for Kettler High School in Chapter 5. This is supported on the P-TECH website where they state, "The P-TECH 9-14 model is designed to motivate and enable more students to earn a college degree and successfully transition into the workplace, with the preparation and skills needed by employers" (Pathways in Technology Early College High School, 2015) In addition to exemplifying P-TECH's value of vocationalisation and commercial interests, this quote highlights some significant tensions within the data in terms of IBM and other industry partners expressing their belief that four-year degrees are over-valued and unnecessary. One of the dominant discourses found throughout P-TECH media documents and their website is the emphasis on the importance and value of higher education. Additionally, in the "why P-TECH" section of their website, IBM highlights the correlation between higher education and life prospects. However, this stands in direct contrast to the views espoused in IBM press releases on their new collar campaign, which actively promotes forgoing a four-year degree on the basis of its limited value for middle-skills jobs. The interviews with IBM employees and each school's industry partners also revealed the consistent view that higher education is not particularly useful or important. Overall, this presents a vision of students as human capital. This is pronounced when considering how much emphasis is placed in education policy on students as future workers that must be equipped with the necessary skills to compete in the 21st century labour market.

The corporate reform movement has entailed a substantial amount of effort to instil faith in markets amongst the public. The carefully crafted rhetoric of "free choice" used to sell vouchers programs is one example of this. This, along with the prevalence of ICTs in society and its associations with progress, innovation, and prosperity, has positioned technology sector actors well in terms of gaining public acceptance for their increased role in education.

The values and interests underlying P-TECH align with most techno-venture-philanthropy endeavours in education. The technocratic corporate reform values derive from the combination of faith in free markets to solve societal ills and the emancipatory potential of ICTs. Beyond being distinct for framing education reform through a technical lens, the technocratic corporate reform movement brings with it important Silicon Valley ideologies introduced in Chapter 1 that further influence the K-12 system. Once again, the ethos of Silicon Valley is characterised by the privileging of disruption over sustainability, rapid knowledge diffusion, innovation, idealism, and individualism, (Rao, 2013; Levina & Hasinoff, 2016). The technocratic corporate reform movement is underpinned by these Silicon Valley values alongside the values guiding an earlier phase of corporate reform outlined above. This new phase of corporate reform in education is also undergirded by a belief that business expertise and technology can be transferred to the education domain. Another distinguishing characteristic of the technocratic reform movement is the direct control and influence the private sector has. The clearest example of this was at Kettler High School (Chapter 5) where business logic and values permeated throughout the P-TECH classes. Educators utilising professionalism and corporate ideals as thinly veiled mechanisms of control was prevalent at both Kettler and C&C (Chapter 7). The way the educators at Kettler would constantly ask students what their IBM bosses would think about their posture or behaviour served as one prominent example. While ACME did not have a strong business-oriented culture, the rapid knowledge diffusion, idealism, and innovation associated with Silicon Valley ethos was present throughout the school. In Chapter 5 I discussed how

students participated in a Spotify competition and how their assignments were often based on quick pitches and innovative ideas. The school was not defined by these ideals but they were present in their curriculum. While the private sector has long enjoyed different levels of influence in public education, never before have they had direct influence over its shape, curriculum, and aim like IBM does with P-TECH.

Another key understanding that emerged from this study is how technology sector philanthropy is deeply ideological. IT professionals behind techno-venture philanthropy are perceived as progressives that incorporate enterprise with "social good" in order to usher in a form of socially inclusive capitalism. The IT industry prides itself on pushing boundaries and cultivating non-establishment perspectives. Guided by the belief in the payoff from taking big risks, techno-venture-philanthropists apply the same techniques used for startups in their education initiatives. Failure is commonplace within the technology industry and most tech giants boast about the many failed projects that led them to their breakthrough. The issue here is that most startups fail and when they do the cost is only money whereas in education the cost equates to dislocations of families and the hindering of students' life chances. The Bill and Melinda Gates' education initiatives serve as prominent examples of what can happen when the technology sector is given too much power in setting education policy. Indeed, most recently Bill Gates and the foundation's chief executive officer, Sue Demond-Hellmann acknowledged that the Bill and Melinda Gates Foundation-backed Common Core standards experiment has failed to achieve most of its objectives (Strauss, 2016; Gates, 2017). They have proven through their admittedly largely failed education initiatives how the approaches and values driving Silicon Valley do not translate to public institutions like education (Kovacs, 2010; Saltman, 2010). The issues with Common Core are attributed to its overly ambitious and rapid pace of design and implementation as well as its ignoring the needs of students with disabilities and English language learners (Lloyd, 2016; Ravitch, 2016). In 2009, the foundation implemented an initiative to improve teaching by pledging up to $100

million to a school district in Florida that would fund bonuses for high performing teachers. However, the Gates Foundation stopped short in its pledge money by $20 million. This left the schools with too large of a cost leaving the least experienced teachers at low-income schools (Editorial Board, 2016). Given these examples and the conflicts in aims between the public and private sector, we should be cautious in allowing techno-venture-philanthropists to determine America's public school agenda.

Ultimately, technology companies such as Apple, Facebook, and Google enjoy a powerful position and cultural reverence in society today. By extending these values to inform the approach to education, if allowed to go unchecked, the technology sector may shape students' values, ideologies, and preferences according to the Silicon Valley ethos. Through these Silicon Valley values and approaches, the influence the technology sector has on educational values is far-reaching and goes beyond the aims of schooling.

8.1.4 Social network analysis and digital capitalism

Unsurprisingly, P-TECH's values and interests closely align with those of the corporatisation of education. Those interests and values include privatisation, vocationalisation, standardisation, accountability, and corporate management. This section situates these values and interests that underlying the P-TECH model within the context of digital capitalism in order to synthesise how they are influencing the K-12 education system.

Digital technologies have given commercial interests greater opportunities to influence the structure, delivery, and aim of education. I argue that digital capitalism has aided in the development of P-TECH and spreads its underlying values while accelerating existing trends resulting from the corporatisation of education movement. The specific trends discussed include: the blurring of public and private spheres, increased privatisation, commodification, and vocationalisation of education. Ultimately, this all demonstrates the current move of public education toward private hands. It further illuminates how these underlying interests and values influence the current shift in the value and aim of education. This influence is

currently being shaped and enabled by the corporate reform agenda with P-TECH representing the role of the technology sector in particular.

Placing capitalism at the centre yields important explanatory insight for the implications of the values underlying the technocratic corporate reform movement in education. Technology companies have invested an estimated $2.3 billion in education technology in the K-12 system. Moreover, funding for private education technology start-ups has increased by over 500 per cent from 2010-2014 (CB Insights, 2015). Technology companies are leading the construction of a shared vision of what the purpose and structure of education should look like.

Digital capitalism in education is marked by the opening of entry points for commercial opportunities through ICTs and the acceleration of the current trends characterising the corporate reform movement. Perhaps the central point of digital capitalism in education is the shift from autonomous instructional and learning processes to education catering directly to labour markets (Schiller, 1999, p. 144). This move to catering directly to labour markets is exemplified in the processes of privatisation and vocationalisation.

8.1.4.1 Privatisation and digital capitalism

Privatisation is when services that were previously controlled and provided by the state are transferred to private companies. It is widely understood as the reduced role of the government and increased control of the private sector in public spaces (Kishan, 2008, p. 114). Specifically for this study, privatisation in education refers to the lessening of government control through the expansion of private sector involvement. Resulting from the privatisation of education are charter schools, voucher systems, and education management companies. While the private sector and public education have an extensive history, it is the proliferation of ICTs over the last few decades that has spawned rapid expansion of privatisation efforts across the US K-12 system.

Interestingly, Change the Equation[14] appeared as a prominent organisational tie within the P-TECH network. This is notable because Change the Equation is a non-profit organisation dedicated to mobilising the business community to improve STEM education in US K-12 schools. The initiative was launched in September 2010 with the help of former President Barack Obama. This opening and expanding of entry points into the education market for technology companies is a clear result of digital capitalism. It also signals another consequence of digital capitalism which is identified as the blurring of public and private boundaries.

The integration of corporations into public institutions such as education is resulting in hybrid public-private spaces that are working to erode the distinction between public and private at every level of government activity. Digital capitalism is the reason why technology companies are at the forefront of this process.

The network analysis findings showed SUNY ranked first on both betweenness and degree centrality measures meaning it is highly connected to a large number of actors and has a significant amount of control over the flows of information throughout the P-TECH network. Despite being the first college partner within the entire P-TECH network, CUNY ranked just below SUNY. However, CUNY's high ranking also suggests it is an influential actor in the P-TECH network which was confirmed through my interviews with the head of CUNY Early College Initiatives. This is all important because SUNY and CUNY have been intricately connected with IBM for a long time. Just this year, SUNY signed several new leases with IBM and the Research Foundation to lead the company's advanced computer chip research and development (Rulison, 2018). Aside from IBM initiating a partnership with CUNY for the creation of P-TECH, CUNY and IBM joint-hosted the highly publicised CUNY-IBM Watson case competition last year.

[14] Change the Equation is made up of over 100 CEOs and is part of the Obama administration's Educate to Innovate Initiative which trained teachers in STEM with the help of IT companies in order to improve the country's STEM education.

Further evidence to support the blurring of public and private spheres aided by digital capitalism is the revolving door of people moving back and forth professionally between public and private sectors. The primary value coming from the study's social network analysis stemmed from its unveiling of key interpersonal ties between IBM executives and government officials then finding out these actors have held prominent positions in both.

The network analysis data showed that IBM's influence is enhanced in the network through Stanley Litow, IBM's Vice President of Corporate Citizenship and Corporate Affairs and President of the IBM International Foundation. He was formerly the Deputy Chancellor of New York City public schools.

The network analysis also illuminated close ties between Joel Klein and Sam Palmisano which presents itself as a particularly interesting connection representing this blurring of boundaries. Joel Klein, former Chancellor of the NYCDOE, is credited as one of the architects of the P-TECH model alongside Sam Palmisano (former CEO of IBM). Stanley Litow (2018) offers an in-depth account of this connection stating that Sam Palmisano and Joel Klein sparked the idea of P-TECH together while attending the US Open Tennis Championship. The two had an extensive history dating back to when Joel Klein worked for the Clinton administration and looked to Sam Palmisano for insight on the IT industry as a recognised expert. During the Obama administration, Sam Palmisano co-led the Commission on Enhancing National Cyber-Security.

IBM is not unique in terms of their employees transitioning into government positions. Indeed, former foundation staff members from Microsoft have also ended up in high positions within the US Department of Education. The revolving door of Silicon Valley executives to and from senior government positions has been increasingly documented across major technology companies including Google, Facebook, Microsoft, Apple, and Amazon (Solon & Siddiqui, 2017).

The reliance on personal networks is embedded in high-tech culture (Everett & Larson, 1984). These key interpersonal ties between the government and IBM can be used to partially explain why P-TECH received a significant amount of praise from high profile and influential government actors in its early stages of development without any data to support its effectiveness. Another explanatory factor contributing to P-TECH's extensive publicity and praise in the media is IBM's branding power. An important statistic that is telling of digital capitalism's influence is that technology companies made up nearly thirty of the top one-hundred brands in the world (Badenhausen, 2018). IBM's brand value is ranked fourth in the world with a value of $48.5 billion (Kauflin, 2017). Taken together, IBM's strategic interpersonal ties with government and their branding power are responsible for the high level of publicity and early praise the P-TECH model has seen.

These findings demonstrate how corporate involvement in education is entangled in complex networks of influence and control. IBM through P-TECH, and other major technology companies involved in public education, are positioned now to steer policies and direct more resources to big business. This blurring of boundaries also provides greater opportunities that allow private actors to shape public agendas. Indeed, education policy is moving away from being based on public voice and input to private spaces increasingly dominated by wealthy corporate philanthropists.

8.1.4.2 Commodification and digital capitalism

The commodification of education is also a trend being accelerated by digital capitalism. Similar to privatisation and the corporatisation of education, commodification shares the belief in market ideologies and represents an attempt at integrating market principles into public institutions (Ball, 2004). It is applied to education contexts to either describe the ways in which consumer culture becomes integrated in everyday lives in subtle ways or the displacement of use values by exchange values (Willmott, 1995; Gottdiener, 2000; Ball, 2004).

Commodification of education in the K-12 system today is represented through the promotion of school choice. Parents are considered to be consumer-citizens that make an informed choice regarding what school they wish to send their student. This is informed by market logic that assumes that competition breeds quality. School choice enables parents to send their kids to the school they desire despite geographic location. The rationale behind school choice is that schools will have to compete for students (consumers) which will encourage them to provide higher quality education. Charter schools such as C&C from Chapter 7 are considered to be choice schools. This has enabled the proliferation of a wide array of online charter schools which eliminate spatial constraints altogether but provide yet another entry point for commercial interests into public education. As demonstrated with C&C, the values and interests underlying the P-TECH model closely align with charter schools. Given this and IBM's branding power, P-TECH would likely thrive even more in terms of appeal in charter school settings.

8.1.4.3 Vocationalisation and digital capitalism

Finally, vocationalisation serves as the last trend in education being propelled by digital capitalism. Vocationalisation of education is most widely understood as the shift in the value and purpose of education where education is moving further away from being understood and valued as a public good and is being reshaped and perceived in instrumental terms purely as a process of creating workers whose labour can be transformed into corporate and financial accumulation.

The vocationalisation of education is currently being intensified and takes on even more significance when considering that private actors are shaping the curriculum. It was shown throughout the data chapters how P-TECH partners have a direct hand in crafting each school's curriculum. Partners from Kettler (Chapter 5) discussed how they crafted curriculum based on the observed skills gaps and industry needs they felt college graduates were lacking. Beyond providing further support for the shift toward more private influence over public

institutions, this points to the importance of questioning the neutrality of these skill gaps and needs expressed by the private actors. It is here where the conflicts emerge between the industry partners' expressed views regarding the overvaluation of college degrees and their hiring practices where those without these college credentials are not given a chance for employment with them. As discussed in Chapters 5 and 7, this tension was made explicit in interviews with Kettler's industry liaison and C&C's principal. In each interview they expressed their views that college is overvalued and there is a significant mismatch between what is being taught in school and what companies actually need. Despite this, when asked whether or not P-TECH students would be considered for non-entry-level positions without a four-year degree they said they would not make it past human resources without those credentials. This tension is problematic for various reasons which are detailed in the following two sections, but these views held by the private partners and C&C's principal work in the community college partners' favour.

The community college partners within the P-TECH network also influence over how the underlying values and interests of P-TECH affect the US K-12 system. Community colleges, acting as agents of change, have the opportunity to either further the traditional democratic values of education or propel those of the corporate reform movement. By partnering with P-TECH, community colleges are more likely to advance the current market-driven, economic-centred mission of education. As such, the market-oriented values and interests underpinning the P-TECH model have implications for the values and cultures shaping schools and the value of education at large. Market-logic is underscored by self-interest and undermines the traditional collectivist goals of public education (Gewirtz, Ball, & Bowe, 1993).

8.1.5 Synthesis of findings and implications for RQ1

Dan Schiller opens *Digital Capitalism* with the following quote*, "*The architects of digital capitalism have pursued one major objective: to develop an economy wide network that can support an ever-growing range of intracorporate and intercorporate business processes"

(Schiller, 1999, p. 1). This objective is becoming realised through the strengthening of free-market capitalism and has radical consequences for public institutions. As such, the values and interests that are embedded in the processes enabling digital capitalism warrant close attention if we are to understand these consequences.

What the close alignment in values and interests between the P-TECH model and champions of the corporate reform movement indicates is how the corporatisation of education is not slowing down. Aided by digital capitalism, P-TECH assists in speeding up the corporatisation of education process and the subsequent traits embedded within. These trends in education are also occurring across the entire public sector including health care, media, and environmental governance. As made clear above, economic logic is often incompatible with the public good and it is important to remain acutely aware of whose interests are represented and being served. This is important in order to know what type of policy safeguards need to be employed so the consequences associated with the reproduction of inequality and furthering the exploitation of civic spaces can be avoided.

Ironically, on their grand mission to improve society through philanthropic initiatives, particularly in education, technology companies have recently been exposed for their engagements in tax avoidance schemes. In 2011 alone, Apple avoided $2.4 billion in taxes. Technology companies including Microsoft, Adobe, and Yahoo, among others, have also been exposed for participating in similar schemes. This is important in the context of current times where the government is issuing detrimental budget cuts across sectors but significantly so in education. As such, these technology companies' participation in tax avoidance schemes resulting in devastating losses in government revenue are actually working to strengthen their role in education by deepening the dependency of public schools on private resources. While this point is might be lost on techno-venture-philanthropists, it remains a significant point to be made regarding the IT industry and digital capitalism's role in the restructuring of education.

Social issues such as poverty are rendered as technical issues that can be ameliorated through technological solutionism (Morozov, 2011). Technology sector actors generally hold technologically deterministic views of social change where everything can be solved through technical solutions. This perpetuates technological optimism which risks overlooking the underlying issues responsible for social inequalities. Furthermore, reducing society to economic and technical problems flattens the complexities inherent in social issues and stifles our ability to understand and propose effective solutions. Education is central to solutionist views. The appeal of technological solutionism is that it is purported to be free from politics and ideology. However, as discussed above, technology is embedded in broader political, economic, and cultural systems making its production and consumption rooted within systems of meanings and values.

Technology and technology industry actors can be forces for improvement but it is not through solutionism and by ignoring the underlying issues responsible for social inequalities. Technology is positioned as the key to progress and technology companies are regarded as global problem solvers. The purpose of education is now to enhance economic productivity. The logic behind ICT-driven education initiatives is that by gaining valuable technical skills students can obtain gainful employment. In all, the values and interests underlying P-TECH has shifted the value and purpose of education which is now rendered in technocratic terms of improving human capital and translated into serving economic needs. To characterise the current context simply as a result of economic elites seeking to impose their will on education is essentialising and deterministic. Education is an increasingly contradictory system governed by antagonistic forces. However, the dominant discourses running through education policy and the corporate reform movement agenda do represent the reintegration of an economic agenda and values into public education.

The findings have demonstrated how the trends of corporate reform have been accelerated by forces of digital capitalism. Perhaps the most significant influence of technocratic

corporate reform values is the continued shift in the value and aim of public education away from its traditional aim to prepare students for the responsibilities of democratic citizenship in a complex society toward one that is becoming wholly economic. The IT sector's increased influence over public institutions allows the private sector to shape the public agenda and threatens to diminish public voice. Additionally, because public and private goals and interests are often at odds with one another, it is important to assess whose interests are being represented and served.

8.2 Consequences of P-TECH's promulgation

The study's second research question serves as a bridge between the first and third questions. It also acts as a conceptual guide for integrating the political economy of communication and cultural studies perspectives. Through an analysis of the underlying values and interests, the first research question provided an explanation of the context that enabled the implementation of a model such as P-TECH and the alignment of values and interests that allowed it to grow. Where the focus was largely on structural forces for the first question this study's second research question is concerned directly with P-TECH, as an entity operating within the system, looking outward and inward. Due to IBM's influence and P-TECH's rapid rise, P-TECH acts as a catalyst for the spread of the values and interests that spawned it. However, there are multitudes of institutional and individual level phenomena that are explored in more depth through this question.

The second research question asks: What are the consequences of P-TECH's promulgation for its stakeholders and the K-12 system? In answering this, the observed benefits and costs of the model are accounted for first. Moving forward, the distribution of benefits across P-TECH stakeholders is outlined. It is through this that enables me to then theorise what the broader consequences of the model on the K-12 education system are. I argue that rather than the pursuit of mere profit, IBM stands to gain significant political influence through their proprietary P-TECH model that enables them to shape society's

agenda according to their needs and interests. I also argue that P-TECH may be working to reproduce existing inequalities through IBM's new collar campaign resulting in social sorting.

8.2.1 Benefits of the model

"P-TECH will give students a chance to succeed coming straight out of high school and be able to go straight to the workforce. Students who graduate *successfully* out of P-TECH have a future that is determined for them."

-Kettler High P-TECH steering committee member

The above quote came from my interview with one of the steering committee members for Kettler High School's P-TECH program. This quote encapsulates both the potential benefits and limitations of the model that are detailed throughout this section. It is clear by now that P-TECH has been promoted as a pipeline to prosperity and is based on a partnership that is mutually beneficial to the public and private sector. However, embedded in this quote are also thinly veiled mechanisms of control utilised by the corporate partners. The term *successfully* indicates the benefits of model are not as widespread as initially perceived.

The general premise behind public private partnerships (PPPs) is that they are meant to ensure shared and balanced decision-making power and equal representation of interests. In the context of PPPs in public education this shared decision-making is also supposed to protect the public's voice. P-TECH's PPP model is based on the following principles: shared and balanced decision-making power, protection of public voices and interests, being mutually beneficial for students and industry. Moreover, P-TECH's partnership model was designed to include relevant expert knowledge for achieving the model's stated goals. As the presentation of data for this study has demonstrated, all stakeholders (schools, educators, students, college partners, and industry partners) serve to benefit from the P-TECH model. However, these benefits are not evenly distributed and are heavily skewed toward industry. Below is an outline of the observed benefits for each stakeholder.

On the P-TECH website, the proposed benefits of the model are outlined as: career readiness, postsecondary degree (Associate degree) completion, and equipping students with the workplace skills and knowledge needed to thrive in the professional world (P-TECH, 2015). It says this is accomplished through a holistic educational approach based on a strategic alignment between industry needs and education. Notably, specified on the website is that

> The P-TECH 9-14 model works for all students, but is especially designed for those who are underrepresented in college, including students who are members of minority groups, those who are economically disadvantaged, and those who are the first in their family to attend college.

The high schools do benefit from the model however, out of each P-TECH stakeholder they benefit the least. While it has not been long enough to be proven yet, the data from interviews with each school principal revealed that high schools benefit primarily by P-TECH students improving the school's dropout rates. The P-TECH website references the Harvard Graduate School of Education report (2011) *Pathways to Prosperity: Meeting the Challenge of Preparing Young Americans for the 21st Century* to highlight the correlation between education and employment. It further states that educators believe the high dropout rates in high schools are due to a lack of connection between curriculum and tangible opportunities in the labour market. This belief and pathways to prosperity rhetoric were echoed strongly by the principals and directors of the P-TECH schools in the interviews for this study. Indeed, the principals stated that P-TECH is offering students a secure and stable future that would not otherwise have it. This was confirmed in Chapter 5, from the interview with Jasmine, the high achieving affluent student pursuing an IBM internship, when she said that most other students were drawn to the program because Ms Hernandez emphasised that they could receive a high paying 60,000-dollar job upon completing their associate's degrees. This was also echoed in Chapter 7 when students discussed their frustrations with the misconceptions around construction and manufacturing jobs and stating that most do not realise how well

paying the jobs can be. It was further supported by the teacher who exclaimed, “were not white collar or blue collar, we’re new collar”.

When asked directly why a school would implement a P-TECH program, each principal stated it was to offer a more useful and effective education model for its students. Many educators believed a central benefit of the P-TECH model for the high schools is greater prestige and credibility by being connected to the P-TECH network. Being a P-TECH school also provides more opportunities for funding. For instance, New York P-TECH schools are able to apply for grants from the DOE that are dedicated specifically for P-TECH schools. All other P-TECH schools are eligible to apply for a variety of federal grants for “innovative school models” and those encompassing a PPP reflecting the government’s desire for increased private sector involvement throughout the education system. In sum, the high schools enhance their reputation, credibility, and prestige by being a part of the P-TECH network, they are eligible for more funding, and assuming the trends of lower dropout rates across P-TECH schools in New York City are generalisable, the high schools also benefit by improved dropout rates which also helps their annual school reports that are often times linked to more funding.

The community college partners benefit in various but mostly unsuspecting ways. In my interviews with the college liaisons at each school, I was told that the P-TECH program aligns with their mission to widen access to higher education to all groups but they emphasised how P-TECH helps the community colleges raise their successful completion rates. For instance, Chapter 6 (ACME), highlighted how the college liaison stated the partnership came with a dual-benefit for them with the first being that it aligns with their mission to widen access and serve marginalised groups and it would help raise their completion rates because of the sustained funding from the NYCDOE for P-TECH students. According to the US Department of Education, only about 22 per cent of all community college students complete their studies within three years (Snider & Dillow, 2011).

Governments and community colleges care about this because the disparity between enrolment and graduation rates is seen as a significant waste of state funds and economic health relies heavily on having an educated workforce. At the centre of its network, P-TECH helps contribute to the goals of City University of New York's (CUNY) Accelerated Study in Associate Programs which aim to increase this statistic both in terms of completion of degree and the time it takes. The way P-TECH does this is through the requirement for students to perform higher than remedial level meaning they are not able to take any development level courses and are only allowed to take the P-TECH college courses if they have a specific grade point average. Additionally, high schools have more support infrastructure than most community colleges so students are guided through their associate degrees with support programs in place such as extra tutoring services that work to increase the likelihood of P-TECH students passing their courses.

Many states have recently adopted different versions of a pay-for-success model for community colleges (Kirp, 2018). This model ties funding to schools' effectiveness which is based on student outcomes including graduation rates. This has already proven to be problematic and unsuccessful at the primary and secondary education levels so it is worth questioning the consequences of this funding to force reform approach. Community colleges with high levels of low-income students will suffer disproportionately because of the lower graduation rates for marginalised groups. However, with the academic performance requirements and extra support mechanisms in place at the high schools to help ensure P-TECH students graduate community colleges seek to gain even more funding.

My interviews with each college liaison also illuminated the important benefit of enhancing their reputation through "community good will" and "social responsibility" contribute to business results. In the age of corporatisation of education, analyses of corporate social responsibility can be extended to universities and community colleges as well. An analysis of social responsibility from community colleges would focus on the ways

in which they address socioeconomic, political, and general inequality issues, as well as engagement with career planning and raising aspirations. If community colleges build positive reputations within the communities they serve they can attract more students which in turn brings the institutions more state funding. Similar to primary and secondary schools serving a high concentration of low-income students, community colleges receive more funding for educating more low-income students. Again, because P-TECH primarily serves low-income students, community college partners stand to gain more funding which is another major benefit for the college partners.

Finally, the P-TECH partnership model allows community college partners to establish relationships and network with industry which can lead to future partnerships with the institution. Partnerships with industry work to enhance the appeal and credibility of community colleges particularly for students seeking to enter the workforce directly after they earn the associate degree. As funding continues to deplete, these partnerships will bring necessary resources colleges will not be able to afford on their own. Indeed, networking is a key component underlying the benefits of P-TECH, which is made most clear when assessing the benefits of the model for students.

The primary benefits of the P-TECH model for its students include the associate's degree and the accumulation of social and cultural capital. The free associate's degree is the most obvious tangible benefit of P-TECH for the students. It was also noted as the biggest appeal and motivation for students joining P-TECH. Offering students who might not otherwise have the opportunity to obtain an associate's degree at no cost to them or their families does the most to aid in the students' upward social mobility that the model presents as a core aim. Indeed, US workers with a high school education or less have the highest rates of unemployment and overall economic instability (National Center for Education Statistics, 2017). Those with at least an associate's degree boost their earning potential by 19.5%, or $31,800 and $38,000 (National Center for Education Statistics, 2018). If P-TECH students

complete the associate's degree and decide to pursue a bachelor's degree they will only pay for two years of higher education as opposed to the standard four.

Another significant benefit of the model for its students is the accumulation of cultural capital. Cultural capital in P-TECH comes from the workplace learning classes where students are taught what is "appropriate" behaviour in professional settings. Some notable topics and skills covered include how to give firm handshakes, the importance of eye-contact, how to have proper posture, how to write a professional email, and how to navigate job interviews. The accumulation of cultural capital is particularly meaningful for P-TECH students specifically because most do not have professional role models to learn from at home and no other way of being exposed to these norms. I conclude that some P-TECH students do accumulate cultural capital through a socialisation process led by educators and private partner liaisons which in turn further alters their habitus through the accumulation of institutional knowledge. As such, students are now positioned to gain social capital through networking and their newfound understanding of what Bourdieu (2004) calls "the rules of the game" highlighted by his concept of field.

If the P-TECH model operates as it should with mentorships and internships for all students then students benefit greatly from building their social capital. The networking opportunities enabled by P-TECH translate into the accumulation of social capital. Their social capital increases through the development of connections with the industry partners and mentors which could lead to important resources and meaningful opportunities. As the data from the three P-TECH schools revealed, it is clear that the students had little opportunity to develop these networks and build their social capital.

Finally, corporate partners benefit greatly from the P-TECH model. In addition to having a pipeline of talent for future employees tailored with the specific skills they need private partners also reap the associated benefits of CSR. Each partner advertises their P-TECH

partnership with the local schools on their websites as a way to enhance their reputation in the community and brand.

8.2.2 Challenges

The challenges facing P-TECH are in many ways the same challenges facing all public private partnerships face. The most prominent challenges observed from the data include unequal distribution of benefits, lack of accountability for private partners, and unstable funding structures. Furthermore, each of these themes serve as threats to the sustainability of the P-TECH model.

The data in Chapter 6 (ACME) included instances of students successfully obtaining internships and acknowledging that they are better equipped to perform in a professional setting. While this may well translate into improved life prospects and promising career opportunities, these were only enjoyed by a handful of students across every school. It is was made clear that these students were the most well-resourced students with high levels of cultural and social capital before P-TECH. This risks reproduction social inequalities by rewarding those already holding high levels of cultural and social capital over the marginalised students the model is meant to serve.

Another challenge observed and expressed by educators was that private partners were not fulfilling their obligations. By not fulfilling their responsibilities, the private partners limited the benefits of P-TECH for students. For example, none of the schools in this embedded case study had mentors or internships for all of their students. Kettler did the best but they had loose guidelines for who qualified as mentors and each mentor had between four and six students each which limited the ability to develop meaningful relationships that would translate into future opportunities.

The last dominant challenge faced by the P-TECH schools was the lack of funding needed to sustain the program/school. The data revealed that this was not an issue with ACME which is in a large metropolitan district (New York City) where longstanding funding structures and

resources were in place. However, a majority of P-TECH schools are not in large metropolises and are struggling to maintain consecutive funding. As discussed in Chapter 5, during my time at Kettler Ms Hernandez constantly expressed how stressful it was to not know where the funding would come from to keep the program going each year. A large part of the funding for P-TECH schools comes from grants that are not automatically renewed. This poses serious threats to the sustainability of P-TECH schools that are not in well-resourced districts or metropolitan areas.

8.2.3 Theorising the barriers to actualizing the purported benefits of P-TECH

Overall, despite the potential benefits and positive accounts presented throughout the data chapters, P-TECH does not represent the unequivocal success story that its early praise has indicated. The barriers to equalising the of benefits of the P-TECH model and current challenges I observed were significant. As outlined above, the data illuminated serious threats to the model's sustainability which has important consequences for students and marginalised students in particular. Furthermore, from these observed challenges it becomes apparent that the increased private sector involvement and control in public education presents troubling implications that need to be checked.

One barrier to realising the potentials of P-TECH entails the types of jobs P-TECH students are being primed for. My interview with Mali from IBM revealed that these jobs were mostly entry-level technical support and marketing positions. Far from being a ticket to the middle class, these jobs entail modest salaries. What is more disconcerting is that the future of these jobs is insecure and increasingly susceptible to automation and outsourcing. This means the very jobs P-TECH students are being trained for may very well be cut in the near future. Once these positions no longer exist, students will be limited to other entry-level jobs unless they earn a four-year degree. As such, a consequence of the P-TECH model for its students is unsustainable and short-term employment with limited opportunity for social mobility. Consequently, students must prepare contingency plans to transition into jobs

requirement more education and different skills. Instead of viewing P-TECH as the end point that suggests students have "made it" P-TECH would benefit from positioning itself as a gateway to higher levels of education and professional experience.

The barrier in place regarding the challenge of private partners not fulfilling their responsibilities is the lack of a way to hold them accountable. This points to the larger threat of increased private sector involvement in public education. Companies such as IBM—who are only accountable to their stockholders—may wield more influence than elected government officials, who are accountable to the public that elected them. As such, there is a serious need for accountability measures to be put in place for P-TECH schools in order to ensure the responsibilities across partners are being fulfilled and the associated benefits are being actualised.

There are many reasons the P-TECH schools face the challenges and barriers to benefits. Some of the reasons include a lack of long-term planning to ensure sustainable funding is in place, the fact that there is no way to hold industry partners to account, and the deeply asymmetric relations of power.

8.2.4 Social sorting and IBM's new collar campaign

What is particularly interesting to note from these observations is how education has consistently aligned with upward social mobility but P-TECH students are being encouraged by IBM to not pursue a four-year degree while simultaneously promoting the opportunity of social mobility through their P-TECH model. The technology sector has also become an equivalent signifier for stability as a four-year degree. However, as the data presented throughout this thesis suggests that this is not the reality. If students want to enjoy more than modest middle-skill wages they will need to acquire a four-year degree or more unless industry partners commit to abandoning traditional hiring practices. Despite this, IBM is actively encouraging students to forgo the four-year degree in order to fill middle-skills jobs. This is being accomplished through IBM's new collar campaign which is based on the

premise that there is an overabundance of highly skilled and highly credentialed individuals as well as lower skilled individuals which is leaving jobs in the middle unfilled. The central aspect of the new collar campaign in terms of P-TECH and the consequences for education is that these jobs require more than high school but less than a four year degree. The P-TECH model is conveniently positioned to help fill this demand with the built-in associate's degree for its students. Indeed, IBM is occupying both the supply and demand side by creating a demand for the P-TECH model through their new collar campaign. A significant consequence of this is that it acts as a class-based social sorting mechanism that works to reproduce existing inequalities.

From the 1980s, a four-year degree is what has distinguished the middle class from low-income Americans (Carnevale, 2012). Blue-collar jobs are increasingly demanding post-secondary degrees as well. Anthony Carnevale (2012) warns "Americans need to understand that the good jobs that require only a high school education are gone and will not be coming back" (Carnevale, 2012, np). While there is data to support that more students are choosing community college after high school, the reason is to save money and take out less loans by spending those first two years at a community college. Indeed, many of these students are transferring to a four-year institution after so it is misguided to claim that this increase in community college enrolment suggests people are no longer pursuing a four-year degree.

ACME presented as the exception to this trend throughout P-TECH of dissuading students to pursue a four-year degree. The principal of ACME acknowledges that society is increasingly over-credentialed, and that industry may believe four-year degrees are over-valued but he astutely observes that companies are still largely dependent on these credentials in their hiring practices and until this changes students will have more opportunities with a four-year degree. Ultimately, there is a mismatch between the emphasis placed on accepting multiple pathways and the goals of P-TECH to send students straight into the workforce. While it is certainly the case that not everyone can afford to continue their education and also

might not benefit much from a four-year degree, the correlation between educational attainment and income persists revealing the limits for the social mobility opportunities enabled by P-TECH that IBM touts. As such, P-TECH schools would do well in making sure the resources are there if students do want to pursue a four-year degree rather than accepting that students who choose their P-TECH school are determined to forgo the four-year degree.

P-TECH and other techno-venture-philanthropy projects move from simply supplying technological resources to shaping the organisation of what school looks like through projects such as the P-TECH model. Perhaps the most striking finding regarding the consequences of P-TECH was the limited role technology itself plays in the model and its benefits. Technology is moved to the periphery and the model and new collar campaign becomes central. The central mission for IBM seems to have shifted from equipping students with necessary technological skills needed for the digital economy to restructuring US secondary education through the spreading of the P-TECH model. The cliché of Silicon Valley's quest to "do good" over maximising profits is expressed through the new collar campaign.

The IT industry is certainly well poised to introduce new ideas and technological products. The continued growth of P-TECH works to legitimise IBM's credibility in education as problem solvers while bolstering the reputation of the tech sector and the ability of technology elites to solve social issues. This points to another consequence of the P-TECH model in that it furthers the private sector's influence over shaping the public agenda their ability to steer education policy.

P-TECH was designed as a scalable model as evidenced by IBM's P-TECH playbook they have created for its replication. In line with the differences between Wall Street philanthropy and techno-venture philanthropy from the technology sector IBM's Stanley Litow said P-TECH represents IBM's "sustainable" approach to corporate philanthropy which refers to IBM's ability to maintain profits. P-TECH is helping IBM maintain profits by acting as a research and development initiative. IBM's proprietary P-TECH model has given them a

low-cost entrance into the organisation of public education. The model's rapid expansion gives rise to IBM's credibility and overall influence in education.

IBM's P-TECH model aligns with another central feature of digital capitalism which is the strikingly low cost of production of goods as many goods in the network society are information-based. IBM has transferred this logic in the creation of P-TECH by not having to make any financial commitments. Leaning on its reputation and credibility as a successful technology company, IBM has essentially "sold" its P-TECH roadmap as an information-based product that is being scaled up with little effort needed by IBM and no financial commitments. The wider the model spreads the more attractive it becomes and demand for P-TECH then becomes a self-reinforcing process. This could serve as IBM's pathway to monopolisation in education which would continue to solidify the technocratic corporate reform movement and the associated values and interests along with it.

8.2.5 Summary and synthesis of consequences for RQ2

I argue that P-TECH's rapid expansion, alongside the praise and support from prominent government officials, reflects the ability of companies like IBM to reshape the public landscape and agendas in their own image. The markets of digital capitalism closely resemble monopoly capitalism from the Fordist era with monopolisation and a general concentration and control of markets. Instead of implementing complementary systems to existing public institutions in order to increase their efficiency by a few percentage points, IBM sees P-TECH as an overhaul on the system giving the company an opportunity to redesign and administer the institutions themselves. As such, as P-TECH continues to spread IBM is well-positioned to be the technology company that takes control of the education market. IBM has the capacity to further restructure the values, aims, and shape of the K-12 system, not just according to broader corporate-reform values and interests, but specifically technology sector values and interests.

I further argued that IBM's new collar campaign will work to solidify their position in education by maintaining demand for their P-TECH model while consequently also being the suppliers. This fact, in conjunction with the peripheral role technology plays in the P-TECH model, as evidenced by the growing constituent of non-technology focused schools such as C&C, suggests that rather than mere profit, IBM is motivated by the prospect of restructuring public institutions according to their commercial agenda. The scaling up and widespread acceptance of the P-TECH model will translate into increased credibility for IBM as education problem solvers. This will garner the company more political clout and influence. These claims regarding IBM's underlying motivations were further supported by the study's social network analysis which highlighted the extensive interrelationship between IBM executives and government officials and positions.

What the political economy and cultural studies perspectives have illuminated throughout this thesis is how it is not P-TECH on its own that is propelling this restructuring but rather broader political and economic processes and a cultural reverence and fetishising of technology and the IT sector. The broader political and economic processes first include the fiscal starvation of public education that is forcing schools to depend more on private resources. Additionally, the policy and public discourse that touts technology as the key to global economic competitiveness and the pressure to prepare students for the information economy is also aiding in bolstering public perceptions of the technology industry equating to stability and prosperity.

Overall, P-TECH does little to challenge the underlying causes of social inequalities and risks perpetuating existing inequalities through the social sorting resultant from IBM's new collar campaign. Dissuading already marginalised youth from pursuing four-year degrees sets them up for middle-skills jobs with middle-skills salaries in a labour market that is increasingly offering less avenues for growth and promotions. Notably, the data revealed an apparent mismatch between industry partners' rhetoric regarding society's over-valuation of

four-year degrees and their hiring practices. If P-TECH's benefits are to be realised, the industry partners need to hire students with less than a four-year degree for higher salary, non-entry level positions and there needs to be some way to hold them accountable to ensure they fulfil their responsibilities of the partnership.

The consequences of the P-TECH model outlined throughout this section are far reaching. At the structural level, P-TECH is propelling the shift in the value and purpose of education which is being shaped by Silicon Valley ideals. The value and purpose of education under the P-TECH model are based on serving commercial interests. If it continues to rapidly expand the P-TECH model will alter the shape of secondary education where it is six years instead of four and all students obtain an associate's degree in a STEM related field while still in high school. In terms of the stakeholders, the consequences of the P-TECH model entail a strengthening of corporate power and a weakening of the public voice. Because public and private aims are often at odds, this increased private sector influence also privileges commercial interests while threatening the representation of public interests in education. Under P-TECH, students are viewed and valued as human capital rather than citizens. In all, the consequences of P-TECH signal the need for implementing a process for robust checks and balances to limit corporate overreach and preserve public interests in education.

8.3 P-TECH's influence on identities and aspirations

The third research question guiding this study captures the implications of the P-TECH model at the everyday level. It did this by assessing the ways in which P-TECH may or may not be influencing students' identities and future trajectories. The question specifically asked: How does the P-TECH model shape students' identities and career aspirations? Chapter 7, (C&C) and Chapter 5 (Kettler) provided the most insight for understanding the ways in which P-TECH is shaping students' identities and aspirations. While ACME Tech from Chapter 6 did not yield much evidence to suggest the students are being heavily influenced toward a particular pathway (university or workforce) and did not have a strong industry

presence, it did present compelling evidence to demonstrate how these influences have the potential to be mediated.

The key findings answering this research question were two-fold. The first has to do with the impact of IBM's new collar campaign, which I argue risks directing working class or low-income students into "probable careers" with limited opportunity to advance beyond middle-skills jobs and salaries. The other is how the culture of P-TECH is resulting in the conditioning of students into corporate subjects, from their mannerisms to their broader values. While I have emphasized how forces of digital capitalism have conditioned the contexts in which P-TECH is operating, I do not assume its consequences are determined by economics. Indeed, each school data chapter illuminates the important role culture plays in the shape of the school and students' identities and aspirations. As such, the last question is answered through this focus on culture while engaging with Bourdieu's theory of social reproduction. Before outlining the answer to this final research question, the concept of identity is briefly revisited.

8.3.1 Identity

As set out in Chapter 2, this thesis adopts the understanding that identity is a set of traits and characteristics, social group memberships, social relations and roles defining who one is and informing their sense of belonging. It is a process-based construct that is fluid and transforms according to specific social contexts (Kellner, 1992). This thesis applies Erving Goffman's dramaturgical approach that posits identity as something that is performed and maintained through social interaction (Goffman, 1959). As a reminder, Goffman's approach examines the impact of environmental contexts on social interaction and group relations conceptualised in terms of theatrical performances utilising concepts such as front stage and back stage to refer to different settings in which people present themselves.

Front stage is "that part of the individual's performance which regularly functions in a general and fixed fashion to define the situation for those who observe the performance"

(Goffman, 1959, p. 22). It provides the basis for others to understand one's character traits and position them through society's shared meaning and categories. The front is where a person fulfils the duties of the social role they are assuming and communicates the characteristics of the role to others. Conversely, the back stage includes private spaces where one does not act and can be their authentic selves.

A key point Goffman makes about identity and presentation of the self is that this is based on socialisation that consists on learning how to play assigned roles which are enacted through social interactions. Goffman's concept of impression management is particularly relevant and important here. As a reminder, impression management uses "sign vehicles" to present oneself to others which takes the form of social settings, appearance, and manner of interacting. Appearance is what determines how first impressions are crafted which includes clothing, stature, posture, race, and physical characteristics aligning with stereotypes. All of this serves as signifiers of status and group membership. Indeed, these act as signaling devices that are used to convey information about how one wishes to be perceived by others. Business professionals wear pressed suits to convey their professionalism and may wear expensive suits and jewelry to indicate their high financial status, which also works to legitimise their status and group membership.

Important for answering this research question is understanding that identity is believed to influence people's motivations, how they view themselves and others, and the actions they take. With this in mind it becomes clear why assessing the ways in which P-TECH is influencing identity and aspirations is particularly significant. The remainder of the chapter is dedicated to answering the study's final research question by outlining the specific ways this is happening.

8.3.2 Group membership, representation, and the technology sector

As discussed in Chapter 5 (Kettler), students recognise that the technology sector is dominated by middle-class white males, and the public perception of IT professionals as

wealthy, highly intelligent white males. The tech industry has been riddled with gender discrimination scandals over the last several years. A now ex-Google engineer garnered the company unwanted international attention for writing an internal memo where he asserted that biological factors explained the gender inequality across the technology sector (Ingram, 2018). In response to these inclusion issues there has been a proliferation of federal, state, and regional initiatives aiming to increase the representation of women and people of colour in STEM fields. The Obama administration implemented the "Computer Science for All" initiative and the current Trump administration is furthering this mission by allocating a minimum of $200 million annually in grant funds specifically for STEM initiatives; P-TECH represents one of these initiatives.

A defining aim of P-TECH is to improve the life prospects of low-income and underrepresented youth. A positive by-product of this was to increase diversity within the heavily white male dominated technology sector. As revealed in the previous section on the second research question, despite this commendable goal, the evolution of P-TECH, through its broader emphasis on middle-skills, has quickly shifted its aims toward restructuring the overall K-12 system. That is not to say that boosting underserved youth toward stability is no longer an important component of the P-TECH model's mission, it is just no longer the central goal. As observed through each P-TECH school in this embedded case study, the students were still predominantly from low-income households. IBM argues that P-TECH will enable upward social mobility for its students as they will be equipped with the skills and knowledge necessary to acquire technical positions across the tech sector. However, as highlighted in Chapter 6, in my interview with Mali, IBM's P-TECH liaison and education manager, the positions acquired by the students who graduated early from the first P-TECH school have primarily been entry-level, non-technical marketing-based positions with meagre salaries. If students want to advance within their companies and increase their salaries they will need to pursue at least a four-year degree. The positions open for P-TECH students and

the associated salaries are just two small aspects of the potential for P-TECH to improve inclusion and representation in the tech sector. An arguably more important aspect of inclusion is the culture of the tech sector, which currently acts as a barrier for improving diversity because many groups lack a sense of belonging and feel they would be excluded.

8.3.3 Sense of belonging

Bourdieu discusses how objective limits transform into a sense of one's place which then leads to self-exclusion by not pursuing entrance into places where one is excluded (Bourdieu, 1986, p. 471). A Bourdieusian sense of place is defined as "one's relationship to the world and one's proper place within it" (Bourdieu, 1986, p. 474). Belongingness entails a deeper sense of shared values, the ability for individuals to present their authentic selves, and the sense of purpose within one's community or social field. It has been noted that inclusion efforts fall short if they do not include ways to cultivate a sense of belonging for all groups (Wadors, 2016). P-TECH has the potential to help bolster students' self-confidence and help marginalised students feel that they have a place in the technology sector, enabling a sense of belonging.

Despite having a similar distribution of low-income students across each school, the students at Kettler and ACME stood in stark contrast to C&C students in terms of their engagement and concern over social inequalities. For instance, there was widespread acknowledgement regarding the lack of diversity across the technology sector by students at Kettler. ACME students were politically engaged and often initiated class discussions on race, class, and gender within the advertising industry as well as their everyday lives. This level of reflexivity and critical lens toward social issues was missing in the data for C&C, which is made up of predominantly white working-class students. This points to the importance of not essentialising class and for analyses to include the complexities of identity that move beyond the established class categorisations to account for these complexities. Exposing the importance of this is an example from the interviews where one of the affluent

white students at Kettler named Emily positioned herself in opposition to the "type of people" P-TECH attracts. In reflecting on what she would change about the P-TECH program, she stated, "I would just rebrand it because right now it attracts students who are unmotivated, unskilled, sort of desperate to make money instead of doing well in school type of people". That same student said she was the only student that was encouraged by the teachers to apply for the IBM internship. She expressed that most students would not apply anyway because they did not think they had a chance against the college students applying for those internships. However, displaying a high level of self-efficacy, Emily felt she had just as much to offer as any college student. Her confidence and pursuit of an IBM internship can partially be attributed to her sense of belonging in those spaces which has been confirmed by her teachers. When I asked other students in the program if they were planning to apply for any IBM internships the question was often met with laughter. Another 10th grade student said,

> Why would IBM want me? I have no clue what it's like to work in tech and besides, there'll be hundreds of computer geeks chomping at the bits for that opportunity so I wouldn't be given even a first look.

When I stated that Emily was going to apply the student said, "well yeah, she's like an overachiever and already knows what they look for and she fits." The above quote demonstrates how a person's sense of belonging can affect motivation and achievement (Trujillo & Tanner, 2014). Because marginalised groups do not reflect the dominant class or perhaps do not embody the associated accepted norms they are further alienated. P-TECH seeks to lessen this alienation by developing students' social and cultural capital in various ways. In light of Goffman's dramaturgical model, hegemony becomes of central importance here by defining "idealised" performance based on ideas of the dominant class. This stems from Marx's understanding of "the ideas of the ruling class" (Marx, 1848, p. 172). Given this, hegemony works to provide a meaningful connection between the macro-level social institutions to micro-level interactions. The data presented has shown the different ways P-

TECH is conditioning students according to hegemonic norms specifically by constructing them as corporate subjects.

The role of audience in Goffman's dramaturgical approach is a critical component. In the case of P-TECH, the primary audience is considered to be the industry partners as they are seen as potential future employers. The idea of industry as audience in P-TECH is built into the fabric of the schools' cultures and practices. This was evidenced in Chapter 5 (Kettler) by educators consistently having students check their behaviours by asking what IBM would think of them. In Chapter 7 (C&C), students were policed through a strict code of conduct that was crafted based on traditional American working-class values. In both cases, students are compelled to perform 'idealised' versions of themselves according to appropriateness. In this way students are implicitly taught to hide contradictory or unfavourable signs attached to their identities that do not align with these idealised performances. Through C&C's strict code of conduct and Kettler's emphasis on how to behave in a corporate environment it becomes clear that P-TECH directly influences the shape of students' identities. The primary mechanism through which this takes place is through concerted efforts to enhance students' cultural capital.

Once again, cultural capital refers to an individual's embodied capacities and possession of institutionalised markers including educational credentials. Cultural capital also captures affective aspects of identity including confidence, belonging, and entitlement (Reay, David, & Ball, 2005). Bourdieu's multifaceted conception of cultural capital is embodied through dress, vocabulary, and manners and institutionalised as academic attainment. P-TECH enhances students' cultural capital by instilling them with these things.

In the acquisition of cultural capital students must conform to an "acceptable" professional identity. The school and private partners work to aid in the students' internalisation of norms and values reinforced throughout the schools. Appearance is what determines how first impressions are crafted. This includes clothing, posture, race, ethnicity,

and physical characteristics aligning with stereotypes. In order to maintain the desired impression, presentations of the self must be habitual. Moreover, performances of the self are fundamentally shaped by social norms. The connection between Goffman's identity and Bourdieu's cultural capital is expressed through cultural capital being used to craft a persona/demeanor (corporate subject) which is presented through interactions with other corporate subjects in actual and simulated corporate environments.

A dominant theme from the data for Kettler (Chapter 5) was the teachers' lack of engagement and uncritical lens toward issues of inequality that their students face in their daily lives. This risks P-TECH students' developing potentially alienating identity dissonance as they increase cultural capital and continue to be socialised into corporate subjects.

While P-TECH is enabling the acquisition of cultural capital, it is still the case that over-arching social structures continue to constrain their opportunities. P-TECH students are meant to internalise the corporate behaviours, values, and norms that are encouraged by the schools and industry partners. This does not happen on its own. It takes educators and mentors to actively shape them, as demonstrated through Kettler and C&C. ACME showed how institutional habitus can work in the opposite direction and act as a mediating factor in resisting corporate conditioning and influence. This is done at ACME by educators adopting a critical gaze toward social issues and consistently engaging in critical discussions with their students around class, race, ethnicity, and gender.

While it is worth critiquing the hegemonic norms and values that influence a person's trajectory and life prospects along with the constrained and deeply unequal facets of the political-economic system, P-TECH does increase students' cultural capital, enabling them to navigate and interact more successfully in the corporate sphere.

8.3.4 Social capital and career aspirations

Where the accumulation of cultural capital influenced P-TECH students' identities in various ways, social capital is observed to influence the students' future aspirations. Social

capital plays a less obvious role in terms of influence and affordances than it did for the successful rapid expansion of P-TECH illustrated in the SNA. However, social capital is still a main contributor for the benefits of P-TECH for marginalised students and can influence students' future trajectories in numerous ways. Students are introduced into a social network of professionals through their mentors, internships, and various industry partner events. The mentoring and internships offer opportunities for students to build relationships with representatives in their respective fields. The internships themselves are advantageous in that they help students gain familiarity with the fields and this familiarity can also enhance their performance during application processes. In my interview with Kettler's industry liaison, I asked if P-TECH students are given any advantage in the application process and he responded that the relationships they build would work in their favour and be looked at more seriously during the application process. However, as illustrated through each school in this embedded case study, the mentorships and internships were not panning out according to the vision and aim of P-TECH.

Institutional habitus can mediate peer and family influences and encourage certain pathways for students. The pathways prescribed for students differed and "expected pathways" were internalised. Institutional habitus is one way that P-TECH influences students' future trajectories. The principals at C&C and Kettler emphasised that their programs were not designed to cater to students who wish to pursue a four-year degree. When asked what the school does to support students who wish to become doctors or scientists, the principal at C&C exclaimed that they would be at the wrong school and he makes it clear to parents that the school trains students for the workforce not college. At Kettler, there was a general acceptance that most P-TECH students would not be pursuing a four-year degree and for those that would, the model still worked for them. Interestingly, the educators and director of the P-TECH program at Kettler often looked at those students that were going to pursue a four-year degree as partial P-TECH students. They believed they were

doing it for the free college credits and internship opportunities to have strong college applications. This was confirmed by each student I interviewed that specified they were definitely going to go straight to university after high school.

Students' choice regarding what they pursue is mediated by many complex factors including peer influence, family networks, familial expectations and responsibilities, gender, class, and ethnicity. What the three P-TECH schools in this study show is how influential school context is. In addition to institutional habitus, the teachers' own social capital and their political and social dispositions are pertinent factors shaping students' decisions regarding their future trajectories. For example, Principal Allen at ACME actively encouraged students to apply to universities based on his own experiences and personal conviction that pursuing a four year degree is a worthwhile endeavour to invest in, as opposed to C&C and Kettler where students were primarily encouraged to go directly into the workforce. Previous research has shown how educators' previous experiences shape their beliefs regarding what is best for their students and that educators' habituses demonstrate different values about whether the students' involvement at universities is worthwhile (Steensen, 2009; Smith, 2011). This has been recognised as unconscious dispositions (Reay, 2004, p. 438) and signals one of the dominant findings in this study: the conflict between industry's views that higher education is over-valued and not equipping students with the necessary skills for industry and companies' hiring practices. P-TECH is supposed to increase students' social capital by facilitating connections to industry actors through the mentorship program. However, the benefits of social capital in this way have yet to be realised because as the data showed, the mentoring is primarily online, offering very few opportunities to develop meaningful relationships. If the students were able to make meaningful connections with their mentors then P-TECH would likely be influencing students' future trajectories even more than they do now.

8.3.5 Socially differentiated trajectories

While some might argue that Bourdieu and Paul Willis' (1977) theoretical frameworks are not as relevant today, arguing that class is not as determining and static as it once was due to increased ethnic diversity in schools and geographical mobility, it was demonstrated through this study's data for each school that class is still a strong determinant for future trajectories. Conceptions of different future paths among P-TECH students are also classed. As an example, some of the marginalised students who perform well enough in school to pursue a four-year degree straight after high school appear to be conflicted about what is "meant for them" and where they are "meant to be". To be sure, this struggle is not only experienced by marginalised students but it does take on different level of significance in this context. These responses once again allude to issues of access related to an individual's sense of belonging.

IBM's new collar campaign is likely to play a major role in influencing students' future pathways. These jobs, according to IBM, require an associate's degree but not a four-year degree. Students enrolling in P-TECH are being encouraged and trained for these new collar jobs and without a four-year degree they will have limited options beyond them. Many educators and private partners I spoke with expressed that the students will be happy to have middle-skills salaries because it will be a step up from what their parents make. This widely held sentiment is prevalent in a class-based feedback loop between educators and administrators that reinforces students' aspirations rather than driving them to pursue higher aspirations. Once again, the sort of "naturalism" of future trajectories that do not involve a four-year degree or highly technical careers is related to what Willis (1977) frames as the systematic suppression of life chances. It is here that P-TECH risks reproducing existing inequalities.

Students deciding between pursuing the four-year degree track or move straight into the work force after graduating from P-TECH are doing so within disparate circumstances, expectations, and constraints. Geography, belongingness, and financial conditions are some

examples of different constraints the P-TECH students face. All students are constrained in some way but the constraints are highly class differentiated.

Geographical constraints were perhaps the most prominent determining factor for the lower-income students choosing their pathways. Students at each school often discussed the importance of staying close to home, regardless of which path they choose but if they do choose to pursue higher education the options are likely severely limited. This stands in contrast to almost every student from more affluent households (despite there not being many) who expressed desires to attend universities out of state. Moving out of the state for most P-TECH students was inconceivable given their constraints, which often included familial responsibilities and limited finances.

While Bourdieu's concept of 'family habitus' proved to be influential in terms of students' aspirations, as demonstrated at C&C where many students are pursuing similar occupations as their parents who served as their motivation for attending P-TECH, it was institutional habitus that shaped the students' identities and aspirations in meaningful ways. While ACME's principal was the exception, it has been made clear how students are being encouraged to forgo a four-year degree and pursue middle-skills jobs. It was found that the primary views held by educators that did not promote students' pursuit of university was not based on a simple "probable careers" belief. They based their actions on the constraints students faced that are outlined above and the level of risk or potential factors prohibiting students from completing courses, such as funding their studies. Overall, their guidance was underlined by paternalistic views.

Promoting multiple pathways is important for several reasons. For one, lessening college enrolment numbers may help halt the increasing marketisation and commodification of higher education. Additionally, tuition fees continue to rise across the country and students are now leaving with crippling student debt and, when this is coupled with wage stagnation, students are likely to see minimal return on their investments. As such, it is important to

promote multiple pathways and accept that university may not be beneficial or appropriate for everyone. However, it is crucial that this promotion of multiple pathways is accompanied by deep reflexivity.

In many ways, P-TECH reinforces students' sense of their place in the world. P-TECH, through institutional habitus, plays a key role in the reconstruction of students' identities. The data proved that there are different benefits and meaningful contributions being made toward the development of belongingness and support for career trajectories from the P-TECH model. However, P-TECH and other ICT-driven education initiatives are ultimately not enough to transform students' 'class of conditions' (Bourdieu, 1990, p. 53). This is not to say that the initiatives should be completely abandoned but it is meant to emphasise the importance of developing approaches that get at the underlying systemic issues in order to alleviate the type of inequality that the model aims to alleviate.

8.4 Summary

Despite the significant opportunities for profit in education, this study's evidence demonstrated that technology companies' interests in education are motivated more by social influence and political clout rather than just mere commercial opportunities. However, this political clout is not wholly divorced from profit as it is through gaining political influence that companies are able to shape policies that ultimately result in profit. Contrasting themselves with Wall-Street philanthropists, techno-venture-philanthropists adopt a different understanding of their relationship with the state. Greg Ferenstein (2016) explained this by stating

> The Silicon Valley ideology thinks about government as an investor rather than as a protector, arguing that the government's role is to invest in making people as awesome as possible. Silicon Valley wants to make people in general educated and entrepreneurial. (Lee & Ferenstein, 2016).

Ferenstein continues on to say that Silicon Valley is pro-capitalist and pro-government, but it is more local-government ideology. These two features of Silicon Valley ideology perfectly encapsulates how P-TECH operates. Regarding its capitalist foundation, P-TECH springs

from capitalism by the values undergirding the model and feeds back into capitalism through the product it creates, namely students as labourers tailored with skills based on specific industry needs. The distinctive perspective of technology elites results in an ideology that has recently been characterised as simultaneously "libertarian but very pro-government". A local-government ideology is embedded in the way P-TECH is implemented as it is always implemented in a local government context. The aim of P-TECH to build local economies and serve local needs depends on local government. The fact that states control their K-12 schools enables P-TECH to expand and adapt to local contexts rather than operating within a one-size-fits-all policy that would come from federal control.

The discussion of the study's findings illuminated how the values underlying P-TECH are influencing the shift in value and aim of public education. As the values and interests behind P-TECH align with those of corporate reform and Silicon Valley ethos, education is increasingly being tailored to serve commercial needs with the aim of equipping students with skillsets needed by industry in order for them to compete in the labour market and fulfil those industry needs. In line with the shifting value and aim of education, the findings demonstrate how current trends of vocationalisation, privatisation, and commodification, are being enabled and accelerated by digital capitalism.

Another key finding discussed was the blurring of public and private spheres with the SNA data providing further evidence. The SNA unveiled close ties between IBM executives and high profile government officials which was used to explain part of the reason P-TECH enjoyed extensive praise from these officials so early on. The SNA also led to the discovery of how extensive the public-private revolving door with technology elites and the government are. The most prominent example being IBM's Stanley Litow, former president of the IBM Foundation, who first worked in education as the Deputy Chancellor of New York City schools.

In terms of the third research question, pertaining to P-TECH's influence on students' identities and aspirations, it was found that institutional habitus plays a key role in shaping students' future trajectories and overall sense of belonging. P-TECH may be working against their aims by directing students toward pathways with little opportunity for growth and social mobility. P-TECH does have the ability to help students gain a firm sense of belonging in the technology sector which would help to diversify the technology industry landscape but private partners need to be willing to hire students for more technical positions with competitive salary offers.

P-TECH represents the new phase of the corporate reform movement where technology elites are leading the way and shaping the agenda. P-TECH works to strengthen the technology sector's influence in education. Aligning with digital capitalism and the evolution of the Internet, P-TECH intensifies the shift in education's value from serving the public good to serving commercial interests. These interests not only shape the public agenda at the macro-level but, as this study has demonstrated through an analysis of IBM's new collar campaign and its promotion of middle-skills, are working to shape students' aspirations and trajectories. Ultimately, these findings can be used to guide and inform policymaking in order to improve the model and ward the risk of P-TECH reproducing existing inequalities.

Chapter 9 Conclusion

It has been made clear that private sector involvement in education is not a new phenomenon. This study represents what is distinct about the current corporate reform movement. What is distinctive about what we are seeing is that technology companies are at the forefront of the current education reform movement as they are guiding policies and leading the restructuring that is underway. Despite the extensive history of private sector involvement in public education, corporate actors have never enjoyed the level of direct influence in public education as they do today. P-TECH is emblematic of the trends characterising the current IT industry led corporate reform of public education making the findings of this study particularly valuable for understanding the K-12 corporate reform context and what is to come.

Academic and policy debates about technology and education have been largely focused on the role of technological hardware itself rather than the broader social structures in which technology-based education interventions operate. As a reminder, social structure is "...the organizational arrangements of humans in relationships of production, consumption, reproduction, experience, and power expressed in meaningful communication coded by culture" (Castells, 2004, p. 1). As such, this thesis makes a substantive, context-rich, empirical contribution to both scholarship and policy by unveiling the underlying interests, values, and consequences of the P-TECH model.

In this final chapter, I will highlight the study's theoretical contributions alongside the main understandings that have emerged from this research, followed by suggestions for policy and direction for future research. Before concluding, I will outline the study's limitations and how fulfilling these limitations in future research will strengthen the claims to knowledge that I have put forth.

9.1 Study's contributions

This study has presented a deeply contextualised account of the P-TECH model, a particular technology-driven education initiative spearheaded by the prominent IT company IBM. It has shown how technology industry actors are able to leverage their social networks and privileged position in society to gain entrance into public education and have undue influence on its shape and aim. This study has offered some explicit implications of P-TECH, ranging from a macro-system-wide level to the impacts on students. Some of these implications inform the following theoretical contributions which are relevant for other assessments on IT sector-led education initiatives.

9.1.1 Theoretical contributions

As I set out from the beginning, this study utilised a theoretical framework that combined two historically antagonistic approaches within communication: the political economy of communication and cultural studies. It was shown here how the two are actually interdependent and, by only adopting one, studies focusing on IT industry-led initiatives in education are often missing important explanatory factors provided by the other. As such, this approach sought to capture what previous studies have not been able to with each approach on their own.

In line with the theoretical framework, the first contribution relates to the interplay of the political economy and cultural studies, or rather, macro- and micro-processes. More specifically, this research showed how what is happening at the structural and micro-levels shape important aspects of each. One particularly prominent example was how IBM's new-collar campaign is working to redefine the value of higher education and influencing low income students' future trajectories, which include foregoing a four-year degree. Moreover, this strengthens the demand for P-TECH as part of their push to devalue a four-year degree by saying they are overvalued and only a two-year associate's degree is necessary for most of the jobs projected to grow and needing to be filled. It is not a coincidence that IBM's new-collar campaign would be based on this premise and that P-TECH has an associate's degree

embedded in the model. Motivated by this finding, a critical argument made in this thesis was that P-TECH represents the typical technocratic approach of corporate education reform. It is not simply about integrating technology in the classroom to develop digital skills but it rather signals the goal of transferring public education into private sector hands. It is more about promoting the practices of technology sector culture and gaining political influence.

If I had only adopted a political economy approach for this study I would have missed important implications of P-TECH regarding the students' future trajectories or the class-based shaping of which paths students are being encouraged to pursue. This was explained by institutional habitus which, in a rapidly expanding model like P-TECH that is seeking to become normalised as the dominant high school model in the country, has major systematic implications. The implications discussed can be summarised as an increased role of the technology sector in shaping the structure, aim, and value of public education according to the capitalist agenda. With hyper-vocationalisation, where schools are simply intended to prepare future workers, education becomes about serving commercial interests rather than the public good. Because of technology's role in society and the government's emphasis on STEM, along with the encouragement to rely heavily on private sector resources in the midst of education budget cuts, IT companies are able to shape the agenda toward their aims. Similarly, those systematic implications revealed in this thesis would have been missed by only adopting a cultural studies approach. Together, it became clear how both are responsible for the general acceptance and propelling of the emerging technology sector led corporatisation of education.

Relatedly, another important theoretical contribution that emerged from this research is how digital capitalism serves as a useful explanation for how the technology sector is becoming increasingly entrenched and has gained direct influence in reshaping public education. Because transnational technology corporations such as Google, Microsoft, Apple, and IBM drive the development of digital technologies which are needed by schools and the

military, the federal and local governments become their largest potential market. Between the push for equipping students with the necessary 21st century skills to compete in the labour market and the heightened anxiety over exacerbating inequalities with the digital divide, there is a need for the resources technology companies develop. In short, digital technologies have given commercial actors greater potential to shape the delivery, structure, and aim of public education. However, these needs alone have merely provided a demand for technology companies to fulfil but other political and economic processes have created the environment that enabled their direct influence and opportunity to reshape education according to commercial needs and values.

This study showed that P-TECH demonstrates how, despite the US K-12 public education system costing well over 500 billion dollars per year, the private sector can exert decisive influence with minimal financial contribution. As education becomes closer aligned with the capitalist agenda and the aim is to serve corporate interests, it will be progressively more difficult to distinguish where public education ends and the corporate world begins. With P-TECH and other technology sector-led education initiatives, it is going to become more challenging to map where the two both fit within the larger education system as outlined in Chapter 8. Indeed, one defining characteristic of digital capitalism is the increasingly blurred boundaries between public and private.

By outlining the political economic processes responsible for opening up public education to for-profit companies this thesis revealed liminal spaces between the public and private sectors. Chapters 4 and 8 covered how digital capitalism in particular contributes to the increasingly blurred boundaries between the public and private sectors and enabled increased influence from the technology sector in education. This contribution indicates that the state-as-client is part of the logic of accumulation and, in the context of the corporatisation of education, is becoming less distinct from private for-profit interests. This is important to note because it illustrates how the goals of corporate reform actually align with those of the state.

This alignment of needs and interests is what Janine Wedel refers to as the "coincidence of interests" (Wedel, 2009) where the needs of government open opportunities for business to profit and contribute to education reform processes.

The value from this study's unique theoretical framework encompassing two historically antagonistic subfields came from demonstrating how they are complementary lenses. It also revealed how the frameworks fail to capture their interrelations when applied on their own. Despite the primary value of this framework being the combination of the two perspectives, it also made important contributions for cultural studies on its own. One of the main contributions for cultural studies in particular includes the extension of Bourdieu's habitus which helped illuminate the classed implications of IBM's new-collar campaign and P-TECH's "training to the middle" goals.

Despite being well-intentioned, educators and P-TECH private partners work to perpetuate social exclusion of their students by constructing them as not academically adept. In this way, P-TECH may be exploitative by discouraging students from pursuing a four-year degree and funneling them into middle-skilled labour with limited opportunity for social mobility beyond new collar wages because it aligns with IBM's agenda. In this way, P-TECH may reinforce students' sense of their place in the world and if the majority of P-TECH students have low self-esteem or academic confidence this works against the aim to empower marginalised students. Ultimately, it was shown how P-TECH, through institutional habitus, plays a key role in the reconstruction of students' identities.

Previous studies have extended Bourdieu's concept of habitus by applying it to the influence of school contexts and identifying it as institutional habitus (Reay, David & Ball, 2001; Reay, 2004; Smyth and Banks, 2012). Institutional habitus plays a key role in shaping the future trajectories of P-TECH students. It was made clear how institutional habitus is the mechanism through which students are conditioned to be corporate subjects. Importantly, it also highlighted how this is sometimes mediated by educators and students like it was at

ACME where that corporate conditioning was very limited. This illuminates potential for more student agency within the P-TECH model but this must include educator-support to happen.

As made clear throughout this thesis, more should be done to promote multiple pathways and a four-year degree may not be desirable for many of the students. However, until companies align their hiring practices with their rhetoric surrounding the overvaluation of the four-year degree then P-TECH is not as democratising as it could be and is believed to be. In detailing the potential reinforcement of class inequality, this research suggests that part of promoting multiple pathways must entail addressing the mismatch in hiring practices and views toward highly-credentialed candidates by industry partners. Nonetheless, P-TECH alone is not sufficient in challenging deeply ingrained norms, values, and beliefs about higher education.

There are legitimate benefits of the P-TECH model that were acknowledged throughout this thesis such as an accumulation of social and cultural capital and an associate's degree at no cost to the families. However, taken together with the current challenges, the P-TECH model seems to be contributing to the reproduction of privilege rather than overcoming persistent inequalities. The key point to be made here that I have tried to demonstrate throughout this thesis is that to present the P-TECH model as a simple phenomenon assessed in binary critical or celebratory terms is misguided. Ultimately, P-TECH, much like research into the impacts of technology in schools has proven, is made up of complexities and contradictions operating within the education system (Apple, 1987; Livingstone, 2011; Warschauer, 2012; Saltman, 2015; Selwyn, 2016). As argued throughout this thesis and in this section, it is both potentially democratising and disempowering; both liberating and exploitative. It is my hope that by emphasising the potential affordances alongside the costs of the P-TECH model within the contemporary US K-12 system, this thesis can contribute to

improving similar initiatives and models moving forward. The following recommendations for policy and practice are meant to fulfil the applied goal of this thesis.

Overall, this study helps to fulfil calls for technology and society researchers to adopt a values-focused analysis that interrogates assumptions and directly engages with the political, economic, and cultural contexts surrounding the socio-technical phenomenon being studied (boyd & Crawford, 2012; McChesney, 2014; Selwyn, 2016).

> Despite a long history of eagerly anticipated but largely unrealised technological transformation, many studies in the field continue to focus on the 'what ifs' and 'best case' examples of education and technology—often producing persuasive evidence of educational potential, but only on occasion acknowledging the individual and institutional 'barriers' that are presumed to be restricting the realisation of this potential in practice (Selwyn & Facer, 2013, p. 3).

In an attempt to provide a more nuanced account of a technology-driven education model that highlights the interrelationship between the state, private sector, and civil society without being overly critical or celebratory I have acknowledged the various social, cultural, and institutional barriers in place, which enables me to put forth recommendations for future policy, practice, and research. Below is a synthesis of some of these challenges discussed alongside some guiding principles and policy suggestions.

9.2 Guiding principles and policy suggestions

As a stated aim of this study was to inform policymaking around technology industry-led ICT-driven initiatives in US K-12 public education, this section presents the observed challenges of P-TECH followed by proposed solutions. The purpose of this section is to translate the insights gained from this study into applicable policy suggestions that may inform strategies geared toward increasing opportunities and improving technology-centred public private partnerships in education meant to serve marginalised youth.

1. Accountability for industry partners

While public private partnerships in education have the ability to bring about valuable resources that the hollowing out of government has left depleted, the most prominent challenge was holding the industry partners accountable in fulfilling their responsibilities of

the partnership. As set out in this study, the high schools found themselves in powerless positions while they tried to make up for the pitfalls resulting from the partners not fulfilling their obligations. This illustrates a need for a corresponding check on technology companies' power. If the model's affordances are to be realised, it is critically important that each partner is held accountable.

For education decision-makers:

- *Rely on contracts with binding agreements as opposed to MOUs.* The key difference between the two is that an MOU does not contain legally enforceable promises. Currently, each P-TECH school uses MOUs for the partnerships with non-binding agreements. Schools contract out for various school support services including specialised instruction and food services, therefore it would make sense that these partnerships are based on contracts as well.
- *Ensure that education interests are represented equally in the contracts and negotiations.*
- A potential recourse for partners not fulfilling their responsibilities could be restricting the opportunity to use the school in any corporate (or community college) advertising or publications. In extreme cases schools could seek litigation to resolve inaction.

For corporate decision-makers:

- *Pursue partnership through most appropriate division based on the business' goal for the partnership.* It makes little sense to go through Corporate Social Responsibility if the goal is to gain specifically skilled employees. Given the stated goal from the corporate partners has been to build a pipeline to employment in their field, companies should consider if Human Resources is more appropriate. This will also

help enable a more holistic engagement between the schools and corporate partners while ensuring it is mutually beneficial.[15]

P-TECH has virtually no oversight in this regard from the federal government as it is controlled at the local level. As such, contracts that help to uphold corporate accountability will also help to improve the current deficits observed from the mentorships.

2. Mentoring

Mentoring ranged from non-existent to primarily online with a couple of meet and greets per school year. The chapters covering Kettler and ACME highlighted students' widespread frustration with the mentoring being almost exclusively online. An obvious limitation with a lack of face-to-face interactions between students and mentors is that students have less of an opportunity to accumulate the social capital that is a major benefit of the model. Mentors act as valuable resources to help students navigate their pathways into employment. It is in everyone's interests within P-TECH to improve the mentor programs. In order to ensure the students are benefitting as they should from the mentorships, there needs to be:

- A clear process in place with clearly defined expectations for both the mentors and mentees, such as a minimum number of quarterly or monthly meetings as well as face-to-face time requirements.
- Mechanisms in place to ensure that all parties are meeting their obligations specifically for mentorships.
- A process for screening mentors and training them.
- Incentives such as recognition awards for employees to attract more mentors or have companies allot a set number of hours for employees to mentor while on the clock.

3. A more equitable distribution of benefits

[15] This last point that addresses the corporate partners is put forth with the understanding that these private companies are now extensively involved in public education and that the state is continuing to encourage this trend while decreasing funds. Rather than endorsing more control for the private sector in public education, it was crafted with the goals of P-TECH's public private partnership in mind.

Another prominent issue discussed throughout the data chapters was how unequal the benefits were for the students and how the students coming in with a high amount of cultural capital were the ones benefitting the most. I argued that these students would likely excel regardless of P-TECH but that it was more egregious because the model was meant to serve marginalised students that would not have the opportunities without it. As such, the following suggestions include a mixture of guiding principles and policy recommendations for P-TECH stakeholders that are meant to improve this distribution and maximise benefits for the intended beneficiaries. In order to have a more equitable distribution of benefits, P-TECH should:

- *Have explicitly student-centred goal*s
    - The students need to be at the centre of all P-TECH goals. A question that should always be asked is, how is this benefitting students?
- Not limit internship candidates to the top performing students only.
- Match internships based on students' interests and aspirations.
- Involve the students in the process of seeking out and establishing internships.

4. Context-driven policies

Each of the school chapters contained a subsection relating to the influence of the school's spatial politics derived from their geographic location. This highlights how influential geographic structures can be and how they impact the variability in the model. In terms of policy, these geographic snapshots have illustrated the importance of context-driven policies to account for the particular social, cultural, economic, and political factors making up each school. Given that the model has expanded and evolved into serving a wider audience without much policy guidance or cultural considerations there is a need to update the application and implementation process for all new P-TECH schools. Rather than being an exogenous factor as it is currently, context needs to be taken seriously and become an integral

part of the implementation process for new P-TECH schools. When establishing a new P-TECH school, corporate funders should:

- Undertake a holistic assessment of the area including the specific needs of the students be a requirement as part of the application process.
- Consider cultural, economic, political, and demographic characteristics of the context.
- Establish at least a 6-year funding plan based on local budgets and guaranteed funding to ensure sustainability of the model in the area.

  These recommendations ultimately serve to improve the adaptive capacity and sustainability of the P-TECH model as it continues to be scaled up and expand across the country while serving the needs of the stated beneficiaries of the model –students.

5. Aligning interests and balancing authority

As made clear throughout this thesis, a key characteristic of corporate reform is the shift in control of policy by unelected and unaccountable corporate reformers who seek to reshape the education system through privatisation and market-based logic. This shift in education policymaking away from the local and public levels toward more private spaces increasingly dominated by corporations and techno-venture philanthropists can threaten the public voice and decision-making power in public education. It is important to ensure there is balanced authority, by which I mean equal positions in the decision-making process for all partners at each P-TECH school. In order to do this, P-TECH partners and decision-makers should:

- Avoid abdicating expertise by determining which actor has the proper expertise to address a particular need or issue.
    - For example, educators know the needs and goals of public education and have a deeper understanding of pedagogy than corporate actors and should therefore not rely on corporate actors to shape curricula.
- Implement federal government regulation on PPPs in public education.

- Apply a multi-stakeholder governance model to P-TECH and include families to ensure the student-centred approach is being upheld.

Separating the capitalist agenda from the education system would be the ideal solution to uphold the democratic ideals and inherent values of education but it is not currently a realistic proposition. As such, the generalisable policy suggestions are designed with the goal of securing democratic decision-making in public education. Looking ahead, we can expect IT industry-led public private partnerships, and IT industry education initiatives in general to continue to proliferate as government funding continues to decrease. As such, it is critically important that steps are taken to ensure corporate actors are not abusing their power and controlling the policy agenda while the public's voice is faded out.

9.3 Limitations of the study

The most obvious limitation of this study is that it is not longitudinal. Qualitative longitudinal data is generally valuable because it produces an understanding of how phenomena change over time (Lavrakas, 2008). For this study, longitudinal data would have been particularly useful in assessing the impact P-TECH is having on inequality by observing the paths students pursue, occupations they acquire, and their average salaries. Given that there were no full graduating classes yet during the time of this research and the time constraints for the study longitudinal qualitative study was not a viable option. However, I do not feel that longitudinal data was required for this study's research questions and aims.

The granularity of the demographic data across each school is arguably limited. For instance, I was not able to have the specific household incomes, parents' occupations and education levels. I had to rely on self-reporting from the students I interviewed and the demographic data reported by the Department of Education (DOE) for each school. This data included the percentage of students from lower-income households and racial and ethnic demographics, with the caveat being that the categories were too broad to account for the true diversity of Kettler students.

Given the goals of the project, the cost and time necessary to gather all of that data outweighed its potential benefit to this study. Ultimately, this is a function of the finitude of the study. Although the data are limited in this regard, the DOE data sufficed by providing the necessary information to support the understandings and arguments put forth.

While there is significant attention paid to class, race, and ethnicity throughout this study, gender is underacknowledged. The lack of deep engagement with gender is partly explained by the research questions not specifically asking about gender. Gender issues at P-TECH, like any research into the context of technology and inequality, would warrant its own thesis. Ultimately, without it being the central focus of the study, this research would not have contributed adequately to further discussions on gender and technology.

Another perceived limitation is that the parent voices are missing from the narratives. I made the conscious decision to focus the qualitative data collection on those with first-hand P-TECH experience. While the parental perspective is important, the comparative element from the embedded case study was more valuable than a single case study that would have been done if parents were included.

Finally, while the theoretical contributions allow for some level of generalisability, this study was restricted to providing rich contextual accounts of P-TECH specifically and thus limits greater generalisability of the recommendations put forth. It is suggested that future studies incorporate other technology company led education initiatives in order to generate suggestions that would be more widely applicable.

9.4 Moving forward

This thesis has set out to provide an understanding of the current IT industry-led corporate reform movement taking hold of the US K-12 system through its focus on the P-TECH model. Beyond the limitations relating to specific P-TECH challenges which limits the ability for generalisation, the limitations of this study offer a basis for future research into industry-led interventions in education. Much like research on the digital divide has evolved to

account for the complexities involved and various forms it takes, studies on technology and education should move beyond focusing on the technological hardware in classrooms. Indeed, future research would benefit by engaging more with issues of control, agency, and the complex power relations underpinning technology-driven education initiatives and models. It is my hope that communication researchers will adopt frameworks that encompass both the political economy and cultural studies lenses in order to continue unveiling the valuable and important ways structural and micro-processes are influencing one another and what the implications are for society.

Although it varies depending on the specific context, educational technology related policies are still replete with democratic discourses surrounding the affordances of technology. It is true that the opportunities for improving life prospects for marginalised students with these initiatives undoubtedly exist. As detailed in chapter 8, P-TECH has the capacity to increase students' social and cultural capitals that can lead to improved life prospects and opportunities for social mobility. However, it is not clear in light of the analysis in this research that even if these affordances are realised for every P-TECH student, they will outweigh the lessened public control as a consequence of the increased IT sector role in education. The policy suggestions put forth were meant to provide some strategies to make these types of initiatives more equitable. As it currently stands though, the data is simply not there to justify the optimism and sustained investments in these initiatives. More work is welcomed in this area to add to the empirical evidence building in this research.

While deriving solutions for local contexts is significantly important, for assessing the affordances and costs (social and financial) of any technological intervention in education it is not enough. As the theoretical framework for this study supports, it is important to engage with the broader political, economic, and cultural systems in which these initiatives operate such as those that have been exposed in this thesis. As Neil Selwyn (2017) purports, "Indeed, there are limits in turning only to the local/peripheral as the default solution to any issue of

injustice and inequality" (p. 185). Future studies would do well in adopting a multi-level analysis as this one has done in order to capture how structural forces are impacting micro-level processes. From this, better policies can be crafted to combat the exacerbation of existing inequalities.

With the continued fiscal starvation and expected rise in IT-industry led technological interventions in education, it is critically important that we improve the context-based evidence and implications for these initiatives. Researchers and policymakers should resist broad-brush assessments that result in either hyper-critical accounts with no way out or overly celebratory accounts that ignore the deep constraints and what is fueling the perpetuation of existing inequalities. Assessing technology and the social systems in which they operate in these ways welcomes promising avenues for both scholarship and policymaking. In order to bring about substantive and meaningful societal change and understanding, all research pertaining to technology and education should engage in broader discussions around the ways in which technology is mediating and sustaining capitalist modernity while focusing on how to actualise technology's affordances for educational good.

References

Achinstein, B., Ogawa, R. T., Sexton, D., & Freitas, C. (2010). Retaining teachers of color: A pressing problem and a potential strategy for "hard-to-staff" schools. *Review of Educational Research*, *80*(1), 71-107.

Adler, P. A., & Adler, P. (1987). *Membership roles in field research* (Vol. 6). Thousand Oaks: Sage.

Althusser, L. (1971). Ideology and ideological state apparatus (Notes towards an investigation). I Lenin and philosophy and other essays (ss. 127-186).

Anderson, M. (2015). *Technology device ownership, 2015*. Pew Research Center. Retrieved from http://www.pewinternet.org/2015/10/29/technology-device-ownership-2015/.

Apple, M. (1987). Teaching and Technology the Hidden Effects of Computers on Teachers and Students. *Educational Policy*, *1*(1), 135-157.

Apple, M. (2006). *Educating the "right" way: Markets, standards, God, and inequality* (2nd ed.). New York; London: Routledge.

Apple Newsroom, (2013, October 28). Apple Reports Fourth Quarter Results. Retrieved from https://www.apple.com/newsroom/2013/10/28Apple-Reports-Fourth-Quarter-Results/.

Archer, L., Hollingworth, S., & Halsall, A. (2007). University's not for Me—I'm a Nike Person': Urban, Working-Class Young People's Negotiations of Style', Identity and Educational Engagement. *Sociology*, *41*(2), 219-237.

Badenhausen, K. (2018). The World's Most Valuable Brands 2018: By the Numbers. Forbes. Retrieved June 13, 2018 from https://www.forbes.com/sites/kurtbadenhausen/2018/05/23/the-worlds-most-valuable-brands-2018-by-the-numbers/#5833a9e52eed.

Baker, A. (2013, October 15). Obama, at Brooklyn school, pushes education agenda. *New York Times*. Retrieved from https://www.nytimes.com/2013/10/26/nyregion/obama-

visits-brooklyn-high-school.html.

Baker, P. and Zeleny, J. (2009, August 15). Emanuel Wields Power Freely, and Faces the Risks. *New York Times*. Retrieved from https://www.nytimes.com/2009/08/16/us/politics/16emanuel.html.

Ball, S. J. (2007). *Education plc: Understanding private sector participation in public sector education*. New York: Routledge.

Ball, S. J. (2008). New philanthropy, new networks and new governance in education. *Political studies, 56(6),* 747-765.

Ball, S. J. (2012). *Global education inc: New policy networks and the neo-liberal imaginary*. London: Routledge.

Ball, S. J. (2016) Following policy: networks, network ethnography and education policy mobilities, Journal of Education Policy, 31:5, 549-566.

Ball, S. J., & Youdell, D. (2007). *Hidden privatisation in public education: preliminary report*. Brussels: Education International.

Barbrook, R. (1995). *Media freedom: The contradictions of communication in the age of modernity*. London: Pluto Press.

Beckman, K., Apps, T., Bennett, S., & Lockyer, L. (2018). Conceptualising technology practice in education using Bourdieu's sociology. *Learning, Media and Technology, 43*(2), 197-210.

Bene, E. (1959). Some differences between middle-class and working-class grammar school boys in their attitudes towards education. *The British Journal of Sociology*, *10*(2), 148-152.

Benkler, Y. (2006). *The wealth of networks: how social production transforms markets and freedom*. New Haven, CT: Yale University Press.

Berg, B. L. (2004). *Qualitative research methods for the social sciences*, Fifth Edition, Boston, MA: Pearson.

Berger, P. L. (1987). *The capitalist revolution*. Aldershot: Gower.

Berger, P., & Luckmann, T. (1967). *The social construction of reality: a treatise in the sociology of knowledge.* London: Allen Lane, The Penguin Press.

Bogdan, R. C., & Biklen, S. K. (1982). *Qualitative research methods for education: An introduction to theory and methods.* Boston, MA: Allyn and Bacon.

Bolton, G. (2010). Reflection and reflexivity: What and why? In *Reflective practice: Writing and professional* development (3rd ed.) (pp. 3-24). London: Sage.

Borgatti, S. P., Everett, M. G., & Johnson, J. C. (2013). Analyzing social networks. London, Thousand Oaks (CA), New Delhi.

Bourdieu, P. (1977). Cultural Reproduction and Social Reproduction. In J. Karabel, & A. H. Halsey (Eds.), *Power and Ideology in Education* (pp. 487-511). New York, NY: Oxford University Press.

Bourdieu, P. (1979). Symbolic power. *Critique of anthropology*, *4*(13-14), 77-85.

Bourdieu, P. (1986). *Distinction: A social critique of the judgement of taste*. London: Routledge.

Bourdieu, P. (1986) 'The Forms of Capital', in J.C. Richardson (ed.) *Handbook of Theory and Research for the Sociology of Education*, pp. 241–58. Westport, CT: Greenwood Press.

Bourdieu, P. (1990). *The logic of practice*. Stanford, CA: Stanford University Press.

Bourdieu, P. (1993). *The field of cultural production: Essays on art and literature*. New York: Columbia University Press.

Bourdieu, P. (1996). *The state nobility: Elite schools in the field of power*. Cambridge: Polity.

Bourdieu, P. (1996). Physical space, social space and habitus. *Vilhelm Aubert Memorial lecture, Report*, *10*.

Bourdieu, P. (2000). Making the economic habitus: Algerian workers revisited. *Ethnography*, *1*(1), 17-41.

Bourdieu, P. (2004). *Science of science and reflexivity*. Oxford: Polity.

Bourdieu, P., & Passeron, J. C. (1990). *Reproduction in education, society and culture* (Vol. 4). London: Sage.

Bourdieu, P., & Wacquant, L. J. (1992). *An invitation to reflexive sociology*. Chicago: University of Chicago press.

Bowles, S., & Gintis, H. (1976). *Schooling in capitalist America* (Vol. 57). New York: Basic Books.

boyd, D., & Crawford, K. (2012). Critical questions for big data: Provocations for a cultural, technological, and scholarly phenomenon. *Information, communication & society*, *15*(5), 662-679.

Bragg, C. (2018). Top state technology official failed to disclose assets on JCOPE form. Retrieved from Times Union, https://www.timesunion.com/7day-state/article/Top-state-technology-official-didn-t-disclose-12994978.php.

Braman, S. (2004). *The emergent global information policy regime* Houndsmills, UK: Palgrave Macmillan.

Breiger, R. L., Carley, K. M., Pattison, P., & National Research Council (U.S.). Committee on Human Factors. (2003a). *Dynamic Social Network Modeling and Analysis: workshop summary and papers*. Washington, D.C.: National Research Council of the National Academies.

Brown, P. (2003). The opportunity trap: Education and employment in a global economy. *European Educational Research Journal*, *2*(1), 141-179.

Brynjolfsson, E., & McAfee, A. (2014). *The second machine age: Work, progress, and prosperity in a time of brilliant technologies*. New York, NY: W.W. Norton & Company.

Buckingham, D. (2005). *Schooling the digital generation: popular culture, the new media and the future of education*. London: Institute of Education.

Buckingham, D. (2007). *Beyond technology: children's learning in the age of digital culture*. Cambridge: Polity.

Buckingham, D. (2009). The future of media literacy in the digital age: some challenges for policy and practice. In *Proceedings of EuroMeduc. Media literacy in Europe: Controversy, challenges and perspectives* (pp. 13-24). Bellarina, Italy.

Buckingham, D., & Great Britain. Office of Communications. (2005). *The media literacy of children and young people: a review of the research literature*. London: OFCOM.

Bulkley, K., & Fisler, J. (2003). A decade of charter schools: From theory to practice. *Educational Policy*, *17*(3), 317-342.

Burch, P. (2009). *Hidden markets: The new education privatization*. New York: Routledge.

Burke, L. M., & McNeill, J. B. (2011). Educate to innovate: How the Obama plan for STEM education falls short. *Backgrounder*, *2504*, 1-8.

Burrowes, J., Young, A., Restuccia, D., Fuller, J., & Raman, M. (2014). Bridge the gap: Rebuilding America's middle skills. *Boston, MA: Accenture, Burning Glass, and Harvard Business School.* Retrieved from *http://www.hbs.edu/competitiveness/Documents/bridge-the-gap. pdf*.

Byrom, T., & Lightfoot, N. (2012). Transformation or transgression? institutional habitus and Working class student identity. *Journal of Social Sciences, 8*(2), 126-134.

Byrom, T., & Lightfoot, N. (2013). Interrupted trajectories: The impact of academic failure on the social mobility of working-class students. *British Journal of Sociology of Education, 34*(5-6), 812-828.

Callahan, D. (2017). *The givers: Wealth, power, and philanthropy in a new gilded age* (First ed.). New York.

Carnevale, A. P., Cheah, B., & Strohl, J. (2012). *College Majors, Unemployment and Earnings: Not all college degrees are created equal*. Georgetown University Center on Education and the Workforce.

Carnoy, M. (1972). *Schooling in a corporate society: The political economy of education in America* (Educational policy, planning, and theory). New York, NY: McKay.

Castells, M. (1996). *The rise of the network society*. Oxford: Blackwell.

Castells, M. (1997). *The power of identity*. Oxford: Blackwell.

Castells, M. (1998). *The information age: Economy, society, and culture: End of millennium*, Vol. 3. Oxford: Blackwell.

Castells, M. (1998). The Real Crisis of Silicon Valley: A Retrospective Perspective. *Competition & Change, 3*(1-2), 107-143.

Castells, M. (2002). *The Internet galaxy: Reflections on the Internet, business, and society*. Oxford: Oxford University Press.

Castells, M. (2004). *The network society: A cross-cultural perspective*. Cheltenham: Edward Elgar.

Castells, M. (2009). *Communication power*. Oxford: Oxford University Press.

Castells, M. (2015). *Networks of outrage and hope: Social movements in the internet age* Cambridge, UK: Polity Press.

Ceci, S., & Papierno, P. (2005). The Rhetoric and Reality of Gap Closing: When the "Have-Nots" Gain but the "Haves" Gain Even More. *American Psychologist, 60*(2), 149-160.

Chakravartty, P.; Castañeda Paredes, M. (2002). Globalisation and critical media studies. *Southern Review, 35*, 63-79.

Chakravartty, P., & Sarikakis, K. (2006). *Globalization and media policy* (Media topics). Edinburgh: Edinburgh University Press.

Chambers, J. (2009). *Madison Avenue and the color line: African Americans in the advertising industry*. Philadelphia, PA: University of Pennsylvania Press.

Chen, K. H., & Morley, D. (Eds.). (2006). *Stuart Hall: Critical dialogues in cultural studies*. London: Routledge.

Chozick, A. (2015). Carly Fiorina announces 2016 presidential bid, citing years leading Hewlett-Packard. The New York Times.

Cloward, R. A., & Jones, J. A. (1962). "Social class: Educational attitudes and participation," in A. H. Passows (ed.) Education in Depressed Areas. New York, NY: Columbia University Press.

Cohoon, J. M. and W Aspray. (2006). "A Critical Review of the Research on Women's Participation in Postsecondary Computing Education," in Cohoon, J. M. and W Aspray [eds] Women and Information Technology: research on underrepresentation. MIT Press, Cambridge MA, 137-80.

Creswell, J. W. (2008). Educational research. *Planning, conducting, and evaluating quantitative and qualitative research*.

Creswell, J. W. (2014). *A concise introduction to mixed methods research*. Thousand Oaks, CA: SAGE.

Creswell, J. W., & Clark, V. L. P. (2007). *Designing and conducting mixed methods research*. Thousand Oaks, CA: Sage.

Crozier, J. (2018, January 8). Shaping the Future Workforce. Working Nation. Retrieved from https://workingnation.com/shaping-future-workforce-jen-crozier/.

Davies, C. A. (2008). *Reflexive ethnography: A guide to researching selves and others*. London: Routledge.

Denzin, N. (1970). Strategies of multiple triangulation. *The research act in sociology: A theoretical introduction to sociological method*, *297*, 313.

Denzin, N. K., & Lincoln, Y. S. (2005). Introduction: The discipline and practice of

qualitative research.

DeWalt, K. M., & DeWalt, B. R. (2011). *Participant observation: A guide for fieldworkers*. Rowman Altamira.

Dewey, J. (1897). *My Pedagogic Creed, by Prof. John Dewey; Also, The Demands of Sociology Upon Pedagogy, by Prof. Albion W. Small*. New York,, Chicago,: EL Kellogg & Company.

Dewey, J. (1916). Democracy and Education. An introduction to the philosophy of education New York, NY: Macmillan.

Dey, I. (1993) *Qualitative Data Analysis: A User-Friendly Guide for Social Scientists.* Routledge, London.

Diamond, J. B., Randolph, A., & Spillane, J. P. (2004). Teachers' expectations and sense of responsibility for student learning: The importance of race, class, and organizational habitus. *Anthropology & education quarterly*, *35*(1), 75-98.

DiMaggio, P., & Hargittai, E. (2001). From the 'Digital Divide' to 'Digital Inequality': Studying Internet Use as Penetration Increases. *IDEAS Working Paper Series from RePEc*.

DiMaggio, P., Hargittai, E., Celeste, C., & Shafer, S. (2004). From unequal access to differentiated use: A literature review and agenda for research on digital inequality. *Social inequality*, 355-400.

Duff, A. (2016). Rating the revolution: Silicon Valley in normative perspective. *Information, Communication & Society, 19*(11), 1-17.

Dwyer, J. (2017, August 24). Showing the Algorithms Behind New York City Schools. The New York Times. Retrieved from. https://www.nytimes.com/2017/08/24/nyregion/showing- the-algorithms-behind-new-york-city-services.html

EdSurge Research. (2016). *How Money Shapes Tools and Schools*. Retrieved from https://www.edsurge.com/research/special-reports/state-of-edtech-2016/funding. [Accessed on: 12 May 2018].

Edwards, M. (2008). *Just another emperor?: The myths and realities of philanthrocapitalism*. New York, NY: DEMOS; London: Young Foundation.

Eynon, R., Fry, J., & Schroeder, R. (2008). The ethics of internet research. In Fielding, N., Lee, R., & Blank, G. (eds.) The *SAGE Handbook of online Research Methods* (pp. 279-304). London: SAGE.

Fadulu, L. (2017, November 21). The Push for Education Programs that Pay People as they Learn. *The Atlantic*, Retrieved from https://www.theatlantic.com/education/archive/2017/11/the-push-for-education-programs-that-pay-people-as-they-learn/546329/.

Fenton, N. (2007). Bridging the mythical divide: Political economy and cultural studies approaches to the analysis of the media. In Eoin Devereux, (ed.). *Media Studies: Key Issues and Debates*, London: SAGE, (pp. 7-31).

Fiske, E. B., & Ladd, H. F. (2000). *When schools compete: A cautionary tale*. Washington, DC: Brookings Institution Press.

Flick, U. (1992). Triangulation revisited: strategy of validation or alternative?. *Journal for the theory of social behaviour*, *22*(2), 175-197.

Flyvbjerg, B. (2006). Five misunderstandings about case-study research. *Qualitative inquiry*, *12*(2), 219-245.

Foroohar, R. E. N. A. (2014, February 24). The school that will get you a job. Retrieved from *Time Magazine* http://content.time.com/time/subscriber/article/0,33009,2165479,00.html

Foucault, M., & Gordon, C. (1980). *Power/knowledge: Selected interviews and other writings, 1972-1977*. New York, NY: Pantheon Books.

Frankenberg, E., & Lee, C. (2002). Race in American public schools: Rapidly resegregating school districts.

Fraser, B.J. (2001) Twenty Thousand Hours: Editor introduction. *Learning Environments Research*, 4(1), 1-5.

Fuchs, C. (2008). *Internet and society: social theory in the information age*. New York; London: Routledge.

Fuchs, C. (2017). Marx's Capital in the information age. *Capital & Class, 41*(1), 51-67.

B. Gates. (2017, October 19). Our education efforts are evolving. *Gates Notes.* Retrieved from https://www.gatesnotes.com/Education/Council-of-Great-City-Schools

Gauntlett, D. (2002). *Media, gender and identity: An introduction*. London: Routledge.

Geertz, C. (1973). Thick description: Toward an interpretive theory of culture. *Turning points in qualitative research: Tying knots in a handkerchief*, *3*, 143-168.

Gewirtz, S., Ball, S. J., & Bowe, R. (1995). *Markets, choice, and equity in education*. Buckingham: Open University Press.

Gibbs, G. R. (2007). Thematic coding and categorizing. *Analyzing qualitative data. London: Sage*, 38-56.

Giddens, A. (1984). *The constitution of society outline of the theory of structuration*. Cambridge, England; Malden, Mass.: Polity Press.

Gilroy, M. (2003). Gates Millions Help Early College Programs Target Minorities; California and New York in the Vanguard. *The Hispanic Outlook in Higher Education, 14*(4), 24.

Giroux, H. (2011). Business Culture and the Death of Public Education: Mayor Bloomberg, David Steiner, and the Politics of Corporate 'Leadership'. *Policy Futures in Education, 9*(5), 553-559.

Goffman, E. (1959). *The presentation of self in everyday life*. New York, NY: Doubleday.

Goffman, E. (1963). *Stigma: Notes on the management of spoiled identity.* New York, NY: Simon & Schuster.

Gootman, E. (2008, March 7). At charter school, higher teacher pay. *New York Times. Retrieved from* https://www.nytimes.com/2008/03/07/nyregion/07charter.html

Gottdiener, M., Ed. (2000). *New Forms of Consumption: Consumers, Culture and Commodification*. Oxford: Rowman and Littlefield.

Graham, M., Dutton, W. H., & Castells, M. (2014). *Society and the internet: how networks of information and communication are changing our lives*. Oxford: Oxford University Press.

Grossberg, L. (1996). Toward a Geneology of the State of Cultural Studies: The Discipline of Communication and the Reception of Cultural Studies in the United States. In Nelson, C., & Gaonkar, D. (Eds.), *Disciplinarity and dissent in cultural studies* (pp. 131-147). London: Routledge.

Grover, C. (2009). Privatizing employment services in Britain. *Critical Social Policy*, *29*(3), 487-509.

Hall, S. (1992). Introduction: identity in question. In Hall, S., Held, D., & McGrew, A. (Eds.) *Modernity and its futures* (pp. 274-280). Cambridge: Polity.

Hanneman, R. A., & Riddle, M. (2005). Introduction to social network methods. Riverside, CA: University of California, Riverside.

Hargittai, E. (2003). The digital divide and what to do about it. In Jones, D. (Ed.), *New Economy Handbook*. San Diego, CA: Academic Press.

Hargittai, E. (2010). Digital Na(t)ives? Variation in Internet Skills and Uses among Members of the "Net Generation". *Sociological Inquiry, 80*(1), 92-113.

Hargittai, E., & Hinnant, A. (2008). Digital inequality: Differences in young adults' use of the Internet. *Communication research*, *35*(5), 602-621.

Harrison, H., Birks, M., Franklin, R., & Mills, J. (2017). Case Study Research: Foundations and Methodological Orientations. In *Forum: Qualitative Social Research,* 18(1), Art. 19.

Harvey, D. (1990). Between space and time: reflections on the geographical imagination 1. *Annals of the Association of American Geographers*, *80*(3), 418-434.

Havins, N. (2014). "Technology industries helped post-Great Recession jobs grow faster in northern than in southern California," *Monthly Labor Review,* U.S. Bureau of Labor Statistics.

Hecht, M. L. (1993). A research odyssey: Toward the development of a communication theory of identity. *Communications Monographs*, *60*(1), 76-82.

Helsper, E. J., & Eynon, R. (2013). Distinct skill pathways to digital engagement. *European Journal of Communication*, *28*(6), 696-713.

Herman, E., & McChesney, R. (1997). *The global media: The new missionaries of corporate capitalism*. London: Cassell.

Hindman, M. (2009). *The myth of digital democracy*. Princeton, N.J.: Princeton University Press.

Ho, K. (2009). *Liquidated: an ethnography of Wall Street*. Durham, D.C.: Duke University Press.

Holstein, J. A., & Gubrium, J. F. (1995). *The active interview.* Thousand Oaks, CA: Sage.

Holzer, H. J. (2018). A “Race to the Top” in Public Higher Education to Improve Education and Employment Among the Poor. *The Russell Sage Foundation Journal of the Social Sciences,* 4(3), 84-99.

Horowitz, D. (1975). Ethnic Identity. *Ethnicity: Theory and Experience.* Cambridge: MIT Press.

Hughes, C. & Blaxter, L. (2007). Feminist appropriations of Bourdieu: the case of social capital. In Lovell, T., *(Mis) recognition, Social Inequality and Social Justice* (pp. 115-137). New York, NY: Routledge.

Hursh, D. W. (2015). *The end of public schools: The corporate reform agenda to privatize education*. New York, NY: Routledge.

Hursh, D. W. (2016). *The end of public schools: the corporate reform agenda to privatize education*. London: Routledge.

Hursh, D.W. (2017). Education Policy, Globalization, Commercialization: An Interview with Bob Lingard by David Hursh. *Policy Futures in Education, 15*(4), 526-536.

Huysman, M., & Wulf, V. (2004). Social capital and information technology: Current debates and research. *Social capital and information technology*, 1-15.

Ingram, N. (2009). Working-class boys, educational success and the misrecognition of working-class culture. *British Journal of Sociology of Education*, *30*(4), 421-434.

Itō, M. (2010). *Hanging out, messing around, and geeking out: Kids living and learning with new media* (John D. and Catherine T. MacArthur Foundation series on digital media and learning). Cambridge, MA: MIT Press.

Jenkins, H. (2006). *Convergence culture: where old and new media collide*. New York, NY: New York University Press.

Johnson, H. and Weller, C. (2017, June 4). IBM launched a high school to churn out workers for corporate tech jobs—take a look inside. *Business Insider*. Retrieved from https://www.businessinsider.com/inside-ptech-ibm-high-school-2017-5.

Jones, E. (1984). *Social stigma: The psychology of marked relationships* (Series of books in psychology). New York, NY: W.H. Freeman.

Jung, E., & Hecht, M. (2004). Elaborating the communication theory of identity: Identity gaps and communication outcomes. *Communication Quarterly, 52*(3), 265-283.

Kauflin, J. (2017, January 17). The world's most sustainable companies 2017. *Forbes*. Retrieved from Forbes https://www.forbes.com/sites/jeffkauflin/2017/01/17

Kellner, D. (1995). Media Communications vs. Cultural Studies: Overcoming the Divide. *Communication Theory, 5*(2), 162-177.

Kellner, D. (2001). Cultural studies and social theory: A critical intervention. In Ritzer, G. & Smart, B. (Eds.) *Handbook of Social Theory,* (pp. 395-409). London: SAGE.

Kellner, D. (2003). *Media culture: Cultural studies, identity and politics between the modern and the post-modern*. New York, NY: Routledge.

Kellner, D. (2006). Communications vs. cultural studies: Overcoming the divide. *Communication Theory,* 5(2), 162-177.

Kirp, D. (2018, June 22). If community colleges want more funding, they have to graduate more students. Los Angeles Times. Retrieved from http://www.latimes.com/opinion/op-ed/la-oe-kirp-community-college-funding-20180622-story.html.

Kishan, N. R. (2008). *Privatization of education*. New Delhi: A.P.H. Publishing.

Klein, J. (2009) New York City Department of Education Strategic Technology Plan. Retrieved from: http://schools.nyc.gov/Documents/MISC/NYCDOEDIITPLAN.pdf

Kovacs, P. E. (Ed.). (2010). *The Gates Foundation and the future of US "public" schools*. New York, NY: Routledge.

Kupchik, A. (2009). Things are tough all over: Race, ethnicity, class and school discipline. *Punishment & Society, 11*(3), 291-317.

Lareau, A., & Horvat, E. M. (1999). Moments of social inclusion and exclusion race, class, and cultural capital in family-school relationships. *Sociology of education*, 37-53.

Lee, T. B. & Ferenstein, G., (2016, February 19). 'Libertarian but Very Pro-Government': The Distinctive Ideology of Silicon Valley. *Vox*. Retrieved from https://www.vox.com/2016/2/19/11057836/silicon-valley-democrat-explained

Levina, M., & Hasinoff, A. A. (2017). The Silicon Valley ethos: Tech industry products, discourses, and practices. *Television & New Media, 18*(6), 489-495.

Lewis, T. (2006). Critical surveillance literacy. *Cultural Studies? Critical Methodologies*, *6*(2), 263-281.

Liebes, T., & Katz, E. (1992). *The export of meaning: Cross-cultural readings of Dallas*. Oxford: Oxford University Press.

Lincoln, Y. S., & Guba, E. G. (1985). *Naturalistic inquiry.* London: SAGE.

Lincoln, Y. S., & Guba, E. G. (1989). Ethics: The failure of positivist science. *The Review of Higher Education*, *12*(3), 221-240.

Lipman, P. (2011). *The new political economy of urban education: Neoliberalism, race, and the right to the city*. New York, NY: Routledge.

Litow, S. (2018). *The challenge for business and society: From risk to reward* (1st ed.). Hoboken, NJ: John Wiley & Sons.

Livingstone, S. (2004). Media Literacy and the Challenge of New Information and Communication Technologies. *The Communication Review, 7*(1), 3-14.

Livingstone, S. (2012). Critical reflections on the benefits of ICT in education. *Oxford review of education*, *38*(1), 9-24.

Lloyd, A. B. (2016, July 17). The math wars wage on: New study finds "new math" unnerving as ever. *The Weekly Standard*. Retrieved from http://www.weeklystandard.com/themathwarswageon/article/2003349

Madikiza, L., & Bornman, E. (2007). International communication: Shifting paradigms, theories and foci of interest. *Communicatio, 33*(2), 11-44.

Marks, A. (2003). Welcome to the new ambivalence: reflections on the historical and current cultural antagonism between the working class male and higher education. *British Journal of Sociology of Education*, *24*(1), 83-93.

Marquand, D. (2004). *Decline of the Public: The Hollowing Out of Citizenship,* Cambridge: Polity Press.

Marshall, C., & Rossman, G. (1989). *Designing qualitative research.* Newbury Park, CA: SAGE.

Marx, K. & Engels, F. (1848). *The Communist Manifesto. Karl Marx: Selected Writings* Oxford: Oxford University Press, (pp. 221-247).

Mason, J. (2002). *Qualitative researching*. London: SAGE

Maxwell, J. (1992). Understanding and validity in qualitative research. *Harvard educational review*, *62*(3), 279-301.

May, C. (2002). *The information society: a sceptical view*. Cambridge: Polity Press.

McChesney, R. (2000). The political economy of communication and the future of the field. *Media Culture & Society, 22*(1), 109-116.

McChesney, R. W. (2013). *Digital disconnect: How capitalism is turning the Internet against democracy*. New York, NY: The New Press.

McCormack, R. (Ed.). (2009). *Manufacturing a better future for America*. Washington, DC: Alliance for American Manufacturing.

McDonough, P. M. (1997). *Choosing colleges: How social class and schools structure opportunity*. Albany, NY: State University of New York Press.

McGivney, V. (1999). *Informal Learning in the Community: A Trigger for Change and Development.* Leicester: National Institute of Adult Continuing Education.

Mead, G. H. (1934). *Mind, self and society* (Vol. 111). Chicago: University of Chicago Press.

Mendick, H., & Moreau, M. P. (2013). New media, old images: constructing online representations of women and men in science, engineering and technology. *Gender and Education*, *25*(3), 325-339.

Merriam, S. B. (2009). *Qualitative research: A guide to design and implementation*. San Francisco, CA: Jossey-Bass.

Mesch, G., Mano, R., & Tsamir, Y. (2012). Minority status and health information search: A test of the diversification hypothesis. *Social Science and Medicine*, 75(5), 854–858.

Moe, M. T., Hanson, M. P., Jiang, L., & Pampulov, L. (2012). *American revolution 2.0: How education innovation is going to revitalize America and transform the U.S. economy.* Woodside, CA: GSV Asset Management.

Molnar, A. (2006). The commercial transformation of public education. *Journal of Education Policy*, *21*(5), 621-640.

Molnar, A. (2018). *Giving kids the business: The commercialization of America's schools*. New York: Routledge.

Montgomery, D. (1980). To Study the People: The American Working Class. *Labor History, 21*, 485-512.

Morley, D. (2003). *Television, audiences and cultural studies*. London: Routledge.

Morozov, E. (2011). *The net delusion: how not to liberate the world*. London: Allen Lane.

Mosco, V. (2004). *The digital sublime: Myth, power, and cyberspace*. Cambridge, MA: MIT Press.

Mosco, V. (2008). Current Trends in the Political Economy of Communication. *Global Media Journal: Canadian Edition, 1*, 45-63.

Mosco, V. (2009). *The political economy of communication* (2nd ed.). Los Angeles, CA: SAGE.

Mosco, V., & Schiller, D. (2001). *Continental order?: Integrating North America for cybercapitalism*. Oxford: Rowman & Littlefield.

Mossberger, K., Tolbert, C. J., & Stansbury, M. (2003). *Virtual inequality: beyond the digital divide*. Washington, D.C.: Georgetown University Press.

National Center for Education Statistics. (2016, July 15). Fast Facts. [Online]. Retrieved from https://nces.ed.gov/fastfacts/display.asp?id=16

Neuman, W. L. (2000). *Social research methods: qualitative and quantitative approaches*. Needham Heights, MA: Allyn & Bacon.

Nicas, J. and Singer, N. (2018, May 22). Apple Unveils New iPad to Catch Google in the Classroom. *New York Times.* Retrieved from https://www.nytimes.com/2018/03/27/technology/apple-classroom-ipad-google.html.

Office of Management and Budget. (2018). Fiscal year 2019 budget of the US Government. Retrieved from: https://www.whitehouse.gov/wp-content/uploads/2018/02/budget-fy2019.pdf.

Oliver, S., Murphy, M., & Tag, N. R. (2014). Advertising summer camp for high school students: A recruitment tool for industry diversity. *Journal of Advertising Education*, *18*(2), 36.

Orfield, G., & Frankenberg, E. (2014). Increasingly segregated and unequal schools as courts reverse policy. *Educational Administration Quarterly*, *50*(5), 718-734.

Ortega, L. (2005). Methodology, epistemology, and ethics in instructed SLA research: An introduction. *The Modern Language Journal*, *89*(3), 317-327.

Otte, E., & Rousseau, R. (2002). Social network analysis: a powerful strategy, also for the information sciences. *Journal of information Science*, *28*(6), 441-453.

Pathways in Technology Early College High School. (2015) [Online]. Retrieved from http://www.ptech.org

Patton, M. Q. (1990). *Qualitative evaluation and research methods.* Thousand Oaks, CA: SAGE.

Patton, M. Q. (2002). Two decades of developments in qualitative inquiry: A personal, experiential perspective. *Qualitative social work*, *1*(3), 261-283.

Palinkas, L. A., Horwitz, S. M., Green, C. A., Wisdom, J. P., Duan, N., & Hoagwood, K. (2015). Purposeful sampling for qualitative data collection and analysis in mixed method implementation research. *Administration and Policy in Mental Health and*

Mental Health Services Research, *42*(5), 533-544.

Patrinos, H. A., & Sosale, S. (Eds.). (2007). *Mobilizing the private sector for public education: A view from the trenches*. The World Bank.

Phillips, A. (2010). Murdoch buys education tech company Wireless Generation. *Chalkbeat*. Retrieved from https://www.chalkbeat.org/posts/ny/2010/11/22/murdoch-buys-education-tech-company-wireless-generation/.

Picciano, A. G., & Spring, J. H. (2013). *The great American education-industrial complex: Ideology, technology, and profit*. New York, NY: Routledge.

Piccoli, S., & Harris, E. (2017, September 6).. New York City Offers Free Lunch for All Public School Students. *The New York Times.* Retrieved from https://www.nytimes.com/2017/09/06/nyregion/free-lunch-new-york-city-schools.html

Postman, N. (1996a). *The end of education: redefining the value of school.* New York, NY: Vintage Books.

Purkey, W. W. (1988). An Overview of Self-Concept Theory for Counselors. Highlights: An ERIC/CAPS Digest. Ann Arbor, MI: ERIC.

Qiu, J. L., Gregg, M., & Crawford, K. (2014). Circuits of labour: A labour theory of the iPhone era. *TripleC: Communication, Capitalism & Critique. Open Access Journal for a Global Sustainable Information Society*, *12*(2), 564-581.

Radway, J. (1984). *Reading the romance: Women, patriarchy, and popular literature*. Chapel Hill, NC: University of North Carolina Press.

Rao, A. (2013). *A History of Silicon Valley: The Greatest Creation of Wealth in the History of the Planet*. Palo Alto, CA: Omniware Group.

Ravitch, D. (2010). *The death and life of the American school system*. New York, NY: Basic Books.

Ravitch, D. (2013). *Reign of error: The hoax of the privatization movement and the danger to America's public schools* (First ed.). New York, NY: Vintage Books.

Ravitch, D. (2016, July 23). The common core costs billions and hurts students. *The New York Times*. Retrieved from https://www.nytimes.com/2016/07/24/opinion/sunday/the-common-core-costs-billions-and-hurts-students.html

Reay, D. (1998). 'Always knowing'and 'never being sure': familial and institutional habituses and higher education choice. *Journal of Education Policy*, *13*(4), 519-529.

Reay, D. (2004). 'It's all becoming a habitus': Beyond the habitual use of habitus in educational research. *British Journal of Sociology of Education, 25*(4), 431-444.

Reay, D., Davies, J., David, M., & Ball, S. J. (2001). Choices of degree or degrees of choice? Class,'race' and the higher education choice process. *Sociology*, *35*(4), 855-874.

Reay, D., David, M. E., & Ball, S. J. (2005). *Degrees of choice: Class, race, gender and higher education*. London: Trentham Books.

Rist, R. (1970). Student social class and teacher expectations: The self-fulfilling prophecy in ghetto education. *Harvard educational review*, *40*(3), 411-451.

Roberts-Mahoney, H., Means, A. J., & Garrison, M. J. (2016). Netflixing Human Capital Development: Personalized Learning Technology and the Corporatization of K-12 Education. *Journal of Education Policy, 31*(4), 405-420.

Robinson, L., Cotten, S. R., Schulz, J., Hale, T. M., & Williams, A. (2015). Introduction: Digital Distinctions and Inequalities, in Robinson, L., Cotton, S.R., Schulz, J., Hale, T. M., & Williams, A, (Eds.) *Communication and Information Technologies Annual (Studies in Media and Communications, Volume 10).* Bingley, UK: Emerald Group Publishing.

Rogers, E. M., & Larsen, J. K. (1984). *Silicon Valley fever: Growth of high-technology culture*. New York, NY: Basic Books.

Roscigno, V. J., & Ainsworth-Darnell, J. W. (1999). Race, cultural capital, and educational resources: Persistent inequalities and achievement returns. *Sociology of education*, 158-178.

Rubin, H. J., & Rubin, I. S. (2012). *Qualitative interviewing: The art of hearing data.* Thousand Oaks, CA: SAGE

Saldaña, J. (2015). *The coding manual for qualitative researchers*. Thousand Oaks, CA: SAGE.

Saltman, K. J. (2010a). *The gift of education: public education and venture philanthropy* (1st-ed.). Basingstoke, UK: Palgrave Macmillan.

Saltman, K. (2016). Corporate schooling meets corporate media: Standards, testing, and technophilia. *Review of Education, Pedagogy, and Cultural Studies, 38*(2), 105-123.

Saltman, K. J. (2016). *Scripted bodies: Corporate power, smart technologies, and the undoing of public education*. New York, NY: Routledge.

Santos, F. New to Teaching, Idealistic, at Risk for Layoff (2011, May 10), *The New York Times*. Retrieved from http://www.nytimes.com/2011/05/11/nyregion/new-idealistic-teachers-face-layoffs-in-bloomberg-budget.html

Schiller, D. (1999). *Digital capitalism: Networking the global market system.* Cambridge, MA: MIT press.

Schiller, D. (2014). *Digital Depression: Information Technology and Economic Crisis (Geopolitics of Information)*. Champaign, IL.: University of Illinois Press.

Schiller, D., & Yeo, S. (2017). *Science and engineering in digital capitalism*. In Tyfield, D. et al. (Eds), *Routledge Handbook of the Political Economy of Science*. Abingdon: Routledge, (pp. 70-82).

Schmidt, J. (2001). *Disciplined minds: A critical look at salaried professionals and the soul-battering system that shapes their lives*. Lanham, MD: Rowman & Littlefield.

Scholz, R. W., & Tietje, O. (2002). *Embedded case study methods: Integrating quantitative*

and qualitative knowledge. Thousand Oaks, CA: SAGE.

Schwandt, T. A., Lincoln, Y. S., & Guba, E. G. (2007). Judging interpretations: But is it rigorous? Trustworthiness and authenticity in naturalistic evaluation. *New directions for evaluation*, (114), 11-25.

Seale, C. (1999). Quality in qualitative research. *Qualitative Inquiry, 5*(4), 465-478.

Selwyn, N. (2007). The Use of Computer Technology in University Teaching and Learning: A Critical Perspective. *Journal of Computer Assisted Learning, 23*(2), 83-94.

Selwyn, N. (2013). *Education in a digital world: Global perspectives on technology and education*. New York, NY: Routledge.

Selwyn, N. (2014). *Distrusting educational technology: The questions we should be asking, but are not: Critical questions for changing times.* New York, NY: Routledge.

Selwyn, N. (2016). *Is technology good for education?* Cambridge: Polity Press.

Selwyn, N. (2017). *Education and technology: key issues and debates*. London; New York: Bloomsbury Academic.

Selwyn, N., Nemorin, S., Bulfin, S., & Johnson, N. F. (2017). *Everyday schooling in the digital age: high school, high tech?* New York, NY: Routledge.

Selwyn, N., & Facer, K. (Eds.). (2013). *The politics of education and technology: Conflicts, controversies, and connections*. New York, NY: Palgrave Macmillan.

Shirky, C. (2008). *Here comes everybody: the power of organizing without organizations*. London: Allen Lane.

Shome, R. (2003). Space matters: The power and practice of space. *Communication Theory*, *13*(1), 39-56.

Silverman, D. (2013). *Doing qualitative research: A practical handbook*. London: SAGE.

Sims, C. (2017). *Disruptive fixation: School reform and the pitfalls of techno-idealism*. Princeton, NJ: Princeton University Press.

Smith, L. (2011). Experiential 'hot' knowledge and its influence on low-SES students' capacities to aspire to higher education. *Critical studies in education*, *52*(2), 165-177.

Smyth, E., & Banks, J. (2012). 'There was never really any question of anything else': young people's agency, institutional habitus and the transition to higher education. *British Journal of Sociology of Education*, *33*(2), 263-281.

Snider, T. A., & Dillow, S. A. (2011). Digest of Education Statistics, Washington, DC: National Center for Education Statistics, US Department of Education, Table 341.

Solon, O., & Siddiqui, S. (2017, September 3). Forget wall street–Silicon Valley is the new political power in Washington. *The Guardian*. Retrieved from https://www.theguardian.com/technology/2017/sep/03/silicon-valley-politics-lobbying-washington.

Spring, J. H. (2013). *Corporatism, social control, and cultural domination in education: from the radical right to globalization: the selected works of Joel Spring*. London: Routledge.

Spring, J. H. (2015). *Globalization of education: an introduction* (Second edition). New York, NY: Routledge.

Soja, E. W. (2010). *Seeking spatial justice* (Vol. 16). Minneapolis, MN: University of Minnesota Press.

Staab, P. & Nachtwey, O. (2016). Market and Labour Control in Digital Capitalism. *TripleC: Communication, 14*(2), 457–474.

Stake, R. (2000). Case Studies in Denzin, N.K. and Lincoln,Y.S. (Eds.) *Handbook of Qualitative Research. Thousand Oaks, CA: SAGE*.

Stake, R. (2006) *Multiple Case Study Analysis* Guilford Press, New York.Suri, H. (2011). Purposeful sampling in qualitative research synthesis. *Qualitative Research Journal*, *11*(2), 63-75.

Steensen, J. (2009). On the Unacknowledged Significance of Teachers' Habitus and

Dispositions. In Bayer, M., Brinkkjaer, U., Plauborg, H., Rolls, S. (Eds.) *Teachers' Career Trajectories and Work Lives* (pp. 71-91). Dordrecht: Springer.

Stryker, S. (1987). Identity theory: Developments and extensions. In Yardley, K. & Honess, T. (Eds.), *Self and identity: Psychosocial perspectives* (pp, 89-103). Oxford, England: John Wiley & Sons.

Stettner, A., Yudken, J. S., & McCormack, M. (2017, June 13). Why Manufacturing Jobs Are Worth Saving. *The Century Foundation.* Retrieved from https://tcf.org/content/report/manufacturing-jobs-worth-saving/

Strauss, V. (2016, June 2). Gates Foundation chief admits Common Core mistakes. *The Washington Post.* Retrieved from https://www.washingtonpost.com/news/answer-sheet/wp/2016/06/02/gates-foundation-chief-admits-common-core-mistakes/?utm_term=.1b28d231f0c3

Sullivan, A. (2001). *Cultural capital and educational attainment*. Cambridge, England: Cambridge University Press.

Symonds, W. C., Schwartz, R., & Ferguson, R. F. (2011). Pathways to prosperity: Meeting the challenge of preparing young Americans for the 21st century. Cambridge, MA: Pathways to Prosperity Project, Harvard University Graduate School of Education.

Taylor, S. J., & Bogdan, R. (1998). In-depth interviewing. In Taylor, S.J., & Bogdan, R. (Eds.) *Introduction to qualitative research methods*, *3*, 87-116.

Thussu, D. K. (2000). *International communication: Continuity and change* London: Bloomsbury Academic.

Timpane, M., Brewer, D., Gill, B., & Ross, K. (2001). *Rhetoric vs. reality: What we know and what we need to know about vouchers and charter schools*. Rand Corporation.

Torpey, E. (2014). Got skills? Think manufacturing. *Occupational Outlook Quarterly, 58*(2), 28-42.

Tracy, S. J. (2010). Qualitative quality: Eight “big-tent” criteria for excellent qualitative research. *Qualitative inquiry*, *16*(10), 837-851.

Trujillo, G., & Tanner, K. D. (2014). Considering the role of affect in learning: Monitoring students' self-efficacy, sense of belonging, and science identity. *CBE—Life Sciences Education*, *13*(1), 6-15.

Tyack, D. B. (1974). *The one best system: A history of American urban education* (Vol. 95). Cambridge, MA: Harvard University Press.

Unwin, P. (2009). *ICT4D: Information and communication technology for development*. Cambridge, England: Cambridge University Press.

Urry, J. (2012). Social networks, mobile lives and social inequalities. *Journal of Transport Geography, 21*, 24-30.

U.S. Department of Education 2010. Science, technology, engineering and math: Education for global leadership. [Online]. Available from: http://www.ed.gov/stem

U.S. Department of Education, 2014. STEM. [Online]. Available from: https://www.ed.gov/stem

U.S. Department of Education, No Child Left Behind Act Secondary and Education Act (ESEA). Ed.Gov. [Online]. Available from: http://www2.ed.gov/nclb/landing.jhtml

Van Deursen, J., Helsper, E., (2015). The third level digital divide: Who benefits most from being online? In Robinson, L, Cotten, S.R., Schulz, Jeremy, Hale, T., Williams, A. (Eds.) *Communication and Information Technologies Annual (Studies in Media and Communications*, Volume 10). Bingley, England: Emerald Group Publishing. (pp. 29-52).

Van Dijk, J. A. (2006). Digital divide research, achievements and shortcomings. *Poetics, 34*(4), 221-235.

Van Fleet, J. (2012). A disconnect between motivations and education needs: Why American corporate philanthropy alone will not educate the most marginalized. In Robertson,

S.L., Mundy, K., Verger, A., and Menashy, F. (Eds.) *Public private partnerships in education: New actors and modes of governance in a globalizing world*. Cheltenham: Edward Elgar. (pp. 158-181).

Villegas, A. M., & Irvine, J. J. (2010). Diversifying the teaching force: An examination of major arguments. *The Urban Review*, *42*(3), 175-192.

Villegas, A. M., Strom, K., & Lucas, T. (2012). Closing the racial/ethnic gap between students of color and their teachers: An elusive goal. *Equity & Excellence in Education*, *45*(2), 283- 301.

Vygotsky, L. S. (1978). *Mind in society: The development of higher mental process*. Cambridge, MA: Harvard University Press.

Wadors, P. (2016). Diversity efforts fall short unless employees feel they belong. Cambridge MA: Harvard Business Review.

Wajcman, J. (2015). *Pressed for time: The acceleration of life in digital capitalism*. Chicago, IL: University of Chicago Press.

Warschauer, M. (2000). Technology & School Reform: A View from Both Sides of the Tracks. *Education Policy Analysis Archives, 8*(4).

Warschauer, M. (2003). Demystifying the digital divide. *Scientific American*, *289*(2), 42-47.

Warschauer, M. (2003). *Technology and social inclusion: rethinking the digital divide*. Cambridge, MA: MIT Press.

Warschauer, M. (2004). *Technology and social inclusion: rethinking the digital divide*. Cambridge, MA: The MIT Press.

Warschauer, M., Knobel, M., & Stone, L. (2004). Technology and equity in schooling: Deconstructing the digital divide. *Educational policy*, *18*(4), 562-588.

Watson, T. (2009). *CauseWired: plugging in, getting involved, changing the world*. Hoboken, N.J.: Wiley.

Weber, M. (1930), *The Protestant Ethic and the Spirit of Capitalism*, translated by Parsons,

Talcott, with a foreword by Tawney, R.H., London: Unwin University Books.

Webster, F. (2014). *Theories of the information society* (Fourth ed.). New York, NY: Routledge.

Wiggins, R. (2000). Al Gore and the creation of the Internet. *First Monday*, *5*(10).

Williamson, B. (2015). Educating the smart city: Schooling smart citizens through computational urbanism. *Big Data & Society*, *2*(2), 2053951715617783.

Williamson, B. (2016). Political computational thinking: policy networks, digital governance and 'learning to code'. *Critical Policy Studies*, *10*(1), 39-58.

Willie, C. V., & Alves, M. J. (1996). Controlled Choice: A New Approach to School Desegregated Education and School Improvement. Providence, RI: Brown University.

Willis, P. (1977). *Learning to labour: How working class kids get working class jobs*. Farnborough, England.: Saxon House.

Willis, P., & Trondman, M. (2002). Manifesto for Ethnography. *Cultural Studies Critical Methodologies, 2*(3), 394-402.

Willmott, H. (1995). Managing the academics: Commodification and control in the development of university education in the UK. *Human relations*, *48*(9), 993-1027.

Witte, J., & Mannon, S. (2010). *The Internet and Social Inequalities (Sociology Re-Wired)* (1st ed.). New York, NY: Routledge.

Yin, R. K. (1984). Applied social research methods series Case study research: Design and methods. Thousand Oaks, CA: SAGE.

Yin, R. K. (1994). *Case study research: Design and Methods* (2nd ed.). Thousand Oaks, CA: SAGE.

Yin, R. (2003). Case study research: Design and methods. Thousand Oaks, CA: SAGE.

Zheng, B., Warschauer, M., & Farkas, G. (2013). Digital writing and diversity: The effects of school laptop programs on literacy processes and outcomes. Journal of Educational Computing Research, 48(3), 267–299.

APPENDIX I

School	Career Focus	Industry Partners
ACME	Advertising and Media	*American Association of Advertising Agencies*
ADK P-TECH	Manufacturing and Transportation	*ETS, Fujitsu, Bombardier, Nova Bus, Spencer ARL, Swarovski*
Auburn P-TECH	Manufacturing	*Manufacturers Association of Central New York (MACNY)*
Be Green	Architecture and Engineering	*Technology, Engineering and Architecture Mentoring (TEAM) through Compliance Administrative Services of New York (CASNY), Montante Solar, Montante Construction, Construction Exchange of Buffalo & WNY, Inc., Construction Industry Education Foundation (CIEF), Canton-Potsdam Hospital, St. Lawrence-Lewis BOCES, United Helpers Compliance and Administrative Services of New York (CASNY), SolarCity Inc.*
BE SOLAR	Energy and Utilities	*SAP*
Business Technology Early College High School	Business	*Bal Seal Engineering, Housing Building Association*
C&C Academy	Manufacturing, Construction	*Building Trades Employers Association of New York City, CH2M Hill*
City Polytechnic High School	Engineering and Architecture	*Global Foundries, CISCO, TRC Solutions*
Clean Technologies & Sustainable Industries ECHS	Energy and Utilities	*Verizon*
Corliss High School	Computer Science	*Central Hudson Gas, Universal Electric Corporation*
E-TECH	Energy and Utilities	*Level 3 Communications*
EC@N-STEM	Computer Science	*Con Edison of New York, National Gril*
Energy Tech High School	Energy and Utilities	*IBM*
Excelsior Academy	Information Technology	*IBM*
Falcon Tech	Information Technology	*IBM*
Federation College	Information Technology	*Arnot Health, Cameron Manufacturing and Design, Corning Hospital, Chemung County Health Department*
Greater Southern Tier STEM Academy	Manufacturing, Energy, and Healthcare	*Alpacas @ Clear View Farm, Avanti Control System, CG Roxane, Dykeman & Son's Inc., Empire State Health Solutions, F-M-S Workforce Development Board, Inc., Fulton Montgomery Chamber of Commerce, Goderie's Tree Farm, Gray's Garden and Greenhouse, Hudson River Tractor Company, Hu-Hill Farm*
HFM Agriculture P-TECH	Agriculture	

		Store, Hulten Speed Sports, Little Falls Veterninary Clinic, Milk Train, Inc., Randall Implements Co., Inc., RC Enterprises, Rockview Farms, Rogers Family Orchard, Seattle Family Farms, Wemple and Edick's,
HFM P-TECH	Business, Health and Computer Information Systems	*AirJet Technologies, BeechNut Nutrition Corporation, Benjamin Moore, Broadalbin Manufacturing, Center For Economic Growth, Cisco Systems, Curtin Hebert Machines, FM Chamber of Commerce, GLOBALFOUNDRIES Inc., Gloversville Sewing Center, Keymark Corporation, Nathan Littauer Hospital & Nursing Home, Townsend Leather, The Fulton, Montgomery, Schoharie Counties Workforce Development Board and Partners, Palio Inc, Net Bank, St. Mary's Healthcare*
Health Education and Research Occupations (HERO) High School	Health	*Montefiore Medical Center*
Hudson Valley P-TECH	Engineering, Computer Information Systems, Green Building Technology and Management	*All-Bright Electric, Alcatel-Lucent, Aireago, Avaya, Brown Management Systems, Computuners, Design Air, Inc., Farmers Insurance, Gotham Telecom, Hi-Tech Security Services, OnForce Soalr, Inc., NYSERDA, Nyack Hospital, Rockland Professional Services, LLC., Wickes Arborists, Yost Design*
Hudson Valley Pathways Academy	Manufacturing	*Hudson Valley Council of Industry*
Inwood Early College for Health and Information Technologies	Health and Information Technologies	*Microsoft, New York Presbyterian Hospital*
Kettler High School	Computer Science	*NewOak Capital, Pitney Bowes*
Lakeview High School	Information Technology	*Microsoft*
Long Island P-TECH	Engineering	*Arkwin Industries and Local Consortium*
Michele Clark High School	Computer Information Systems	*Cisco*
New London ECO: Science and Technology Magnet High School of Southeastern Connecticut	Manufacturing	*General Dynamics Electric Boat, Eastern Advanced Manufacturing Alliance*
Newcomb Secondary College	Health, Information Technology and Business	*Barwon Health, Bendigo Bank, GMHBA, Tribal Group, Opteon Property Group*
Newport P-TECH	Cybersecurity	*Southeastern New England Defense Industry Alliance*
Northern Borders Academy	Health Technology	*Adirondack Health Institute, Northern Area Health Education Center/United Helpers, St.*

Northern P-TECH Academy	Health	*Regis Mohawk Tribe Education Services, North Country Workforce Development Board, Alice Hyde Medical Center, Citizens Advocates, Inc. Massena Memorial Hospital, Northern Area Health Education Center/United Helpers, St. Lawrence Health Alliance, Inc., Canton-Potsdam Hospital, Kinney Drugs*
Norwalk Early College Academy	Information Technology	*IBM*
Oswego County P-TECH	Advanced Manufacturing	*Novelis, Huhtamaki, Sonoco, The Fulton Companies,*
P-TECH Health Occupation Pathways to Employment (HOPE)	Health	*Catholic Health*
P-TECH OHM	Semiconductor Manufacturing	*Mohawk Valley EDGE (Economic Development Growth Enterprises Corporation), Oneida, Herkimer*
P-TECH PPSD	Network Infrastructure and Software Development	*United Natural Foods, Inc., FM Global, Tech Collective*
P-TECH Rochester STEM High School	Computer Information Technology	*Monroe Community College Business Consortium*
P-TECH Westerly	Advanced Manufacturing	*General Dynamics Electric Boat, Rhode Island Manufacturers Association*
P-TECH @ Carver	Cybersecurity and Information Technology	*IBM*
P-TECH @Dunbar	Health Science and Health Information Technology	*Kaiser Permanente, Johns Hopkins University*
PTECH Health Careers Academy @ Henninger High School	Health	*Crouse Hospital, Laboratory Alliance of Central New York, POMCO Group Insurance Company, St. Joseph's Hospital Health Center, SUNY Upstate Medical Center, Syracuse Community Health Center*
Pathways in Technology Early College High School	Computer Information Systems, electromechanical engineering technology	*IBM*
Riverfront P-TECH	Electrical Engineering, Manufacturing Technology, Biotechnology	*GE Health Care, Regeneron, Simmons Machine Tool Corporation*

APPENDIX II

Research recruitment flyer

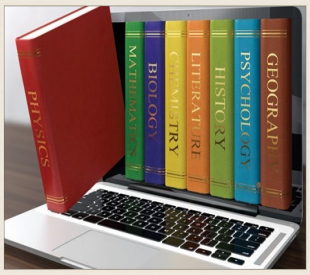
INFORMATION FOR PARENTS AND GUARDIANS

Participation: I will be attending classes at your child's school in order to understand the P-TECH model. I'll be speaking to teachers and students about their experiences with P-TECH in order to see what they like and what they would like to see added to enhance their education and further their future goals.

Purpose: The information gathered during my time at your child's school will be used to see how the innovative model and use of technology can be used in education.

Privacy: Everything will be completely anonymous and used for research/academic purposes only. Parts of the study may be published in academic journals but there will be no names or personally identifying information at all.

P-TECH STUDY



What? This study is exploring how P-TECH schools provide all young people with the best possible educational and career opportunities through the innovative use of technology.

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UNIVERSITY OF OXFORD

TECHNOLOGY & EDUCATION



If you have any questions or concerns about the study please do not hesitate to contact Paige Mustain at (619) 908-0920 or paige.mustain@oii.ox.ac.uk

APPENDIX III

P-TECH Model: a case study of digital inequalities in education
Information for Parents

Invitation
I would like to learn about your child's experiences with P-TECH. I will be observing various classes over the next month. All information gathered during my visits will be completely confidential and anonymous and used for research purposes only. The following information is intended to help you decide whether this is something you would be happy for them to do - please read it carefully. Please do ask if there are any aspects of the project that are unclear or if you would like more information before deciding whether or not you would like your child to take part in this research. If you have any questions please contact Paige Mustain (paige.mustain@oii.ox.ac.uk).

What is the purpose of the study?
The purpose of this study is to better understand the P-TECH model and the role of technology in education more broadly. I am interested in how educators, students, and private partners feel about this kind of learning experience: what they like and don't like about it, what aspects of the P-TECH experience they find particularly valuable, and future goals.

What will I have to do?
If you would not like your student to participate please fill out the attached opt-out form and have your student give it to their teacher or you can email me directly with a signed opt-out form. Everything observed will be kept anonymous. The project has been reviewed by, and received ethics clearance through, the University of Oxford Central University Research Ethics Committee.

What will happen to the results of this research?
I will speak to 40 other people who are involved with P-TECH. All conversations and observations will then be taken together to help me understand the P-TECH model and role of technology in the school. All names will be changed along with details of everyone I speak to – so no one apart from myself as the researcher will know who took part in the study or what they said. All data will be stored very securely on a password-protected computer. Once the analysis is complete the data will be deleted. All data will be held in accordance with the 1998 Data Protection Act.

Some results may be reported at academic conferences and/or published in academic journals but no one at the school will be identifiable from these outputs. If you wish to obtain a copy of the published results, please let me know and I will send you copies when I write them.

Contact for Further Information or Follow-up
If you have any further questions about this research, please feel free to contact Paige (paige.mustain@oii.ox.ac.uk).
Should you have any questions, comments, or further information, your inquiries are most welcome at any time.

THANK YOU FOR TAKING THE TIME TO READ THIS INFORMATION

APPENDIX IV
Consent Form

I agree to take part in the study.

1. I have read and understood the information about this study and have had the opportunity to ask questions and get satisfactory answers about this study.
2. I understand that agreeing to take part means that I am willing to: participate in a 1-hour interview about P-TECH.
3. I understand that my participation is voluntary, and that I can choose not to participate in part or all of the project, and that I can withdraw at any stage of the project without being penalized or disadvantaged in any way simply by informing the research of my decision.
4. I understand that any information I provide is confidential, and that no information that could lead to the identification of any individual will be disclosed in any reports on the project, or to any other party. No identifiable personal data will be published and the data will not be shared with any other organization.
5. I am aware of whom to contact should I have questions following my participation.
6. I understand that this project has been reviewed by and received ethics clearance through the University of Oxford Central University Research Ethics Committee.

I hereby agree to participate in this study.

Name:…….....(please print)