

**The Fourth Industrial Superintendent: Transforming Public School Systems Beyond 21st
Century Mindsets**

by

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Abstract

With the advancement of artificial intelligence, machine learning, cybersecurity, and other disruptive technologies indicative of the fourth industrial revolution, are reshaping the current workforce. Literature points to the need to realign American K–12 education to fit the organizational workforce of the future. Inquiry-based learning (IBL) practices is how other nations are currently training their citizens for the next industrial revolution. The United States continuously struggles to educate students from historically marginalized communities in an equitable way as studies have shown how schools that cater to a diverse population of students are not using IBL practices which will essentially allow all students access into the future workforce. The conceptual framework used within this study is based on one of a handful of technological historians that research how technology impacts historically marginalized communities. This study focuses on the innovation portion of how a superintendent created and spread his shared vision throughout his school district. Appreciative inquiry was used to help guide participants through a reflective practice as they discussed how they imagined, produced, employed, the shared vision of shifting pedagogical practices from a factorized model of education toward equitable IBL practices of learning focused on real-world projects. Findings show a pattern that follows the conceptual framework as the superintendent and district leaders have created their own system wrapped around IBL strategies and iterative processes of continual growth.

Keywords: fourth industrial revolution, K–12 superintendents, appreciative inquiry, organizational leadership

Dedication

To my daughter, I look forward to who you will be in this world. If anything, I hope that you are a producer, not a consumer of technology. I hope that you are willing to take risks and learn from any mistakes. I hope that you are happy in whatever type of endeavors you pursue. Thank you for your understanding and sharing me with this work.

To my husband, thank you for being a rock and having a vision for our family. Thank you for your all your support as we continue to affect student lives, let it be known that we did it together as a team.

To my mother and father, thank you for listening to my wild ideas and lifting me up on your shoulders. I understand that I am not only my ancestor's wildest dreams, I am also your wildest dreams. When I speak, I speak your wisdom that you instilled in me. Thank you.

To all my in-laws, thank you for being with us through the good and bad times. You have always been walking with me step by step. I thank you for raising two wonderful awesome men and pouring into them even when you had nothing to give. It is such an honor to be your daughter-in-law.

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Author's Note

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I have no conflicts of interests to disclose

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Chapter One: Introduction

For the past couple of decades, public school systems have attempted to integrate a 21st-century model of learning in the classroom. The 4Cs model of communication (critical thinking, communication, collaboration, and creativity) has been studied throughout the education field (Fullan et al., 2018). Mehta and Fine (2019) conducted a 6-year ethnographic study on various high schools throughout the United States in which they followed children to each of their classes for many weeks in search of inquiry-based learning (IBL). Findings were that most private and affluent schools implement IBL, and schools that catered to a more diverse population were not implementing IBL core classes like reading, math, social studies, and science. One reason is that these schools still follow the rigid standards of a school system based on the Second Industrial Revolution, during which researchers considered the mechanicalizing of the school system (Darling-Hammond, 2014; Dintersmith, 2018). Darling-Hammond (2014) discussed how deeply the Second Industrial Revolution model of education is still intertwined in the U.S. school system, stating that “today’s schools were designed when the goal of education was not to educate all students well but to batch process a great many efficiently, selecting and supporting only a few for ‘thinking work’” (p. 237).

The *Future of Jobs Report* (World Economic Forum, 2018) describes the rapid change in the workforce that will occur between 2018 and 2022 because human total task hours will decrease from 71% to 58%, and machine task hours will increase from 29% to 42%. The latest report released in December of 2020 described the job market as having an uncertain future for the time being due to COVID-19, yet the pace of technology is expected to remain unstoppable and has accelerated in some job sectors (World Economic Forum, 2020). The report also projected 85 million jobs worldwide being displaced due to the division of labor between

humans and machines and highlights how employers see a rise in jobs that need workers with skills in critical thinking, self-management, and the ability to solve problems. The urgency of schools and districts to adopt this teaching style is imperative to align the type of education system that will parallel the future workforce.

One recurring theme in research as it pertains to the 21st-century superintendent is the specific need for school districts to have a vision for technology and IBL (Anderson & Dexter, 2005; Houston, 2001; International Society for Technology Education, 2009; Martinez, 2017; Richardson et al., 2015; National Policy Board for Educational Administration, 2015; Sterrett & Richardson, 2019). At the turn of the century, Houston (2001), a former superintendent, stressed the important mind shift a well-rounded superintendent of the 21st century needed to have. He believed that the reform efforts of the past were “built on a mechanistic world view that stresses fixing the parts to create a better whole” (p. 431). Instead, he envisioned creating a system based on a human ecological enterprise to champion students, calling upon 21st-century superintendents to focus on the “organic and holistic qualities of learning and to structure learning that speaks to the hearts and minds of learners” (p. 431). The qualities needed for this new type of system were wrapped around the crucial Cs: connection, communication, collaboration, community building, child advocacy, and curricular choices. The catalyst for change in school districts begins with the vision and then the transfer of this vision to others (Houston, 2001; Howard et al., 2019; Liou & Daly, 2019). This study examined how the imagination of a superintendent transfers and spreads throughout a district to make second-order changes toward IBL enhanced by technology.

Background

Intersection of Technology and Education in the United States

With the growth in artificial intelligence (AI), nanotechnology, biotechnology, and robotics, humans are about to experience a shift in the workforce, which researchers call the Fourth Industrial Revolution (Bongomin et al., 2020; Bruun & Duka, 2018; Ford, 2013). Many technology futurists discuss a singularity shift, which is when AI technology performs tasks or reasoning processes typically associated with human intelligence and learning capabilities (Bruun & Duka, 2018; Cass, 2012). Although technology futurists debate over the utopian nature or technological employment devastation of such a singularity, various countries are currently consolidating efforts to reskill and upskill their national citizens by aligning their national education curricula with content and skills focusing on science and technology that will prepare their learners for the future workforce (Aziz Hussin, 2018; Hariharasudan, 2018; Kusmawan et al., 2020; Naterer, 2019).

The United States has also implemented a curriculum for the 21st century called the Common Core States Standards Initiative (CCSSI) to set uniform national academic standards for math and English language arts from Kindergarten through Grade 12 and focuses on using content from the framework to develop future competency skills called the 4Cs: critical thinking, communication, collaboration, and creativity (Common Core State Standards Initiative, 2020; Jochim & Lavery, 2015; Lee, 2020; Naterer, 2019). Naterer (2019) specifically named non-replaceable skills (e.g., creativity, problem-solving, drawing conclusions, critical thinking, teamwork, interpersonal skills, leadership, and entrepreneurship as resiliency skills) to equip students with proper skills that are not susceptible to automation. Unfortunately, the United States has an intersectionality in the attainment of education with the placement of accountability

in the school system. Patel (2016) discussed that students are at a societal disadvantage due to “flimsy theories of learning that conflate learning and pedagogy for test score production” (p. 400). Schools have been clinging to standardized testing, for which teachers are now expected to teach a curriculum aligned to testing accountability. All the while, IBL is a type of constructivist learning framework that has been proven to increase resiliency skills but has not been proven to boost test scores on standardized tests in the core subjects of reading and math (Kingston, 2018; Mehta & Fine, 2019).

Alternatively, even though technology is the key to the future workforce, school districts have always been hesitant to invest in technology beyond basic connectivity, not only due to budget restrictions but also due to the lack of evidence that increased access to technology leads to increased student achievement on standardized testing (Belew, 2018; Lynch, 2018; Pittman & Gaines, 2015; Reid, 2014; Ritchel, 2011). Hattie (2008) synthesized metadata that measured the effects of specific teaching strategies and classroom infrastructure’s impact on student achievement. He specifically discussed technology to engage instruction, but without strong teaching strategies, technology does not have any effect on student achievement. Thus, he stressed the importance of schools concentrating on professional developments that prioritize teaching strategies above implementing technology since student achievement was affected by the competence of the teacher’s pedagogical skill, not the technology. Thus, the lack of efficacy research, educators’ technological knowledge, and budget contributed to school boards’ lack of approval regarding expanding advanced technologies (Belew, 2018).

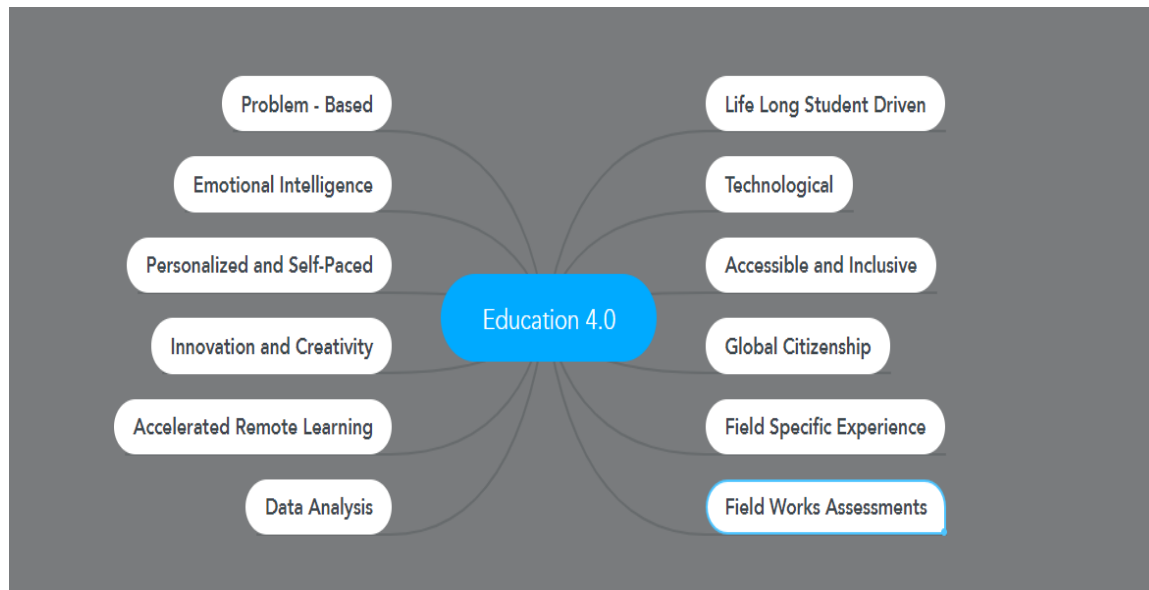
World View of Industry 4.0 and Education

Countries such as India, Malaysia, Singapore, and the United Kingdom have coined the term “Education 4.0,” which is defined as the aligning pedagogy for industrial revolution 4.0

(Aziz Hussin, 2018; bin Ismail & Haniff, 2020). Figure 1 is a list of Education 4.0 competencies that instructors need to begin to incorporate to develop pupil skills for the next industrial revolution.

Figure 1

Education 4.0 Competencies



Many of these competencies are skills that can immediately be addressed in schools at this time. Table 1 shows the progression of the U.S. school system in terms of alignment with the various industrial revolutions. An Education 1.0 model of learning would be a static education with the teacher teaching at the front of the room while the students sit in rows listening and regurgitating information. The Education 2.0 model, which is what many schools are accustomed to currently, is a system where the teacher has many activities for students, and internet connectivity is implemented in a controlled environment. However, students are still expected to consume learning and technology to ultimately regurgitate the information onto a test. Freire (1970) called this the banking model of education. A 3.0 model of education is considered a deeper learning inquiry-based model of learning, where teachers and learners co-construct knowledge, are digitally competent, and produce knowledge and content. Lastly, according to Mizan bin Ismail and Haniff (2020), the Education 4.0 model is where the learners are deeply engaged in being experts in their interest, consuming content as needed, consistently using technology to analyze concepts, and working in tandem with technology as a vehicle of learning in collaborative teams to think creatively and critically about issues and problems in their field of study. Essentially, the learning will follow the student in a more synchronized fashion. The Malaysia Education Blueprint 2015–2025 aims to ensure that Malaysia’s education system aligns with the global trends of this new revolution so its citizens may be prepared for the future workforce.

Table 1*Progression of Education 1.0–4.0*

Education revolution	Methods	Technology
Education 1.0	Dictation	Not allowed during the education process
	Instructivism Direct transfer of information	
Education 2.0	Progressivism Begins to open to internet access	Limited access
Education 3.0	Knowledge producing Co-constructivism	Full access for knowledge Construction and transmission
Education 4.0	Innovation producing Replacing classrooms	Always changing Learners as major source technology evolution

Although many schools have adopted IBL models, IBL, which includes project-based learning (PBL), is still an Education 3.0 model. Many 4.0 competencies will not be realized until the school systems incorporate artificial technology to monitor and adapt curriculum per pupil (Kusmawan, 2020). Many of these competencies are part of the World Economic Forum's eight characteristics, as its report agreeably called the acquisition of skills education 4.0 (World Economic Forum, 2020).

Inquiry-Based Learning

Various models of IBL have been implemented in many schools and have been linked to deeper levels of critical thinking, creativity, communication, and collaboration, but have not been proven to boost test scores on standardized tests in the core subjects of reading and math (Kingston, 2018; Mehta & Fine, 2019). Inquiry-based learning is a framework where students engage in large, sustained projects connected to real-world topics that give them agency to create

sustainable solutions to a problem. Students work collaboratively in groups to research, recommend solutions, create prototypes of their solutions, and present their solutions to an audience. Teachers are guides and co-learners in the process as they scaffold content, give direction, introduce the community into the classroom by having mentors, and create space for feedback and reflection for students. Unfortunately, according to PBLWorks, IBL has been proven to increase critical thinking, communication, collaboration, and creativity, but it has not been substantiated as a pedagogical practice that improves test scores (Kingston, 2018). Thus, according to Mehta and Fine (2019), schools and districts that adopt this new type of learning system often conflict with the current 2.0 system of accountability and standardized testing.

Key findings from the World Economic Forum's (2020) report were eight characteristics to define learning in the Fourth Industrial Revolution: global citizenship skills, innovation and creativity skills, technology skills, interpersonal skills, personalized and self-paced learning, accessible and inclusive learning, and lifelong student-driven learning. Various countries are consolidating efforts to reskill and upskill their citizens by aligning their national education curricula with content and skills that will prepare learners for the future workforce (Aziz Hussin, 2018; Hariharasudan, 2018; Kusmawan, 2020; Naterer, 2019). Zhou et al. (2020) discussed the historical aspect of how China's Ministry of Education emphasized developing a preliminary plan for E-education as early as 1978. In 2018, China's Ministry of Education began to modernize information by incorporating big data and AI, calling their plan the "Action Plan for Educational Informatization 2.0" (Zhou et al., 2020, p. 507). This new plan demanded infrastructure upgrades, broadband networks for each school, high-quality resources for every class, and an online learning space for everyone, including tutoring. Therefore, when China had to implement a social distancing protocol, the infrastructure was already in place. Due to

education being a localized public service, the U.S. Department of Education does not have a national education technology plan. Therefore, in a crisis like national school closures due to a pandemic, individual localities must adapt without national guidance.

District of the Future

In 2019, a small suburban school district outside Los Angeles began its first year of integrating IBL and technology for students. According to local news reports not cited here for confidentiality, parents from historically marginalized communities felt the district treated their students differently, citing institutionalized racism and unintended bias. Although the district is one of the top districts in California, with accountability measures in reading and math 39% above California averages, the achievement gap was apparent in test schools and in how students experienced school daily. With California's proficiency level marked at 800, White and Asian proficiency scores were 907 and 941, whereas Black and Latinx scores were 697 and 728, respectively.

In 2016, an equity review was conducted on the district, which led to a new equity in action plan that the district has been focused on implementing. The same year, the community chose a new superintendent with a strong background in creating coalitions around cultural proficiency and building systems of cohesion. One local news source cited the school board president saying that the new superintendent would move their students towards the future. Inquiry-based learning with constructivist instruction had already been implemented at one school in the district, but in 2016 a new article published information about the school being on the state list of low-performing schools.

By 2017, the school board was presented with a proposal recommending expanding the constructivist IBL elementary school model as an option for secondary students and considering

full district implementation by the 2019–2020 school year (Carreras, 2018). Why did the new superintendent decide to expand on an unproven program? When reviewing the school's accountability report card from 2018, the achievement gap is still there, and they only test 50% of the students. What is different about this school? This study intended to understand the superintendent's vision for his district. Through interviews with the superintendent, district leaders, principals, and parent focus groups, this case study examined the creation of the vision and how the vision transferred to district leaders and principals. Using a cycle proposed by technology historian Sinclair (1998), I observed how parents experienced this vision from an end-user standpoint.

Statement of the Problem

Students moving into a new pedagogical framework is now critical as the world is preparing citizens for the future workforce during the Fourth Industrial Revolution. Several intersections directly affect access to the future workforce among marginalized communities. Mehta and Fine (2019) discussed how schools that serve diverse populations are not receiving the deeper learning experiences needed to move toward a 3.0 model of education. Transitioning to virtual learning this year has placed a spotlight on marginalized communities as it pertains to the vast digital divide in urban communities of color and rural America. The separation of technology from Black Americans began at the beginning of the first industrial revolution through processes, policies, and master narratives of insufficient intelligence as it pertains to operating new technologies. With each industrial revolution, new technologies have created either more work, dangerous work, or technological unemployment for Black people. In creating access for students to have sufficient skills in the future workforce, much research points to problem-posing, IBL learning. Due to a standardized 2.0 model of education held accountable to

state testing that measures surface knowledge over deep learning, schools and districts have a difficult time implementing new inquiry-learning models. Thus, without access to the correct pedagogical framework, the utopian idea that all Americans will acquire a higher level of leisure and freedom from work during this next industrial revolution should cause skepticism for all due to an analysis of technological history. To ensure access to the new Fourth Industrial Revolution, there must be a clear pathway for school districts to move pedagogy from a 2.0 framework toward a 3.0 framework and be ready to change into the 4.0 framework as newer technologies become available.

Purpose of Study

The purpose of this study was to provide insight into how a superintendent creates, transfers, and spreads a shared vision throughout a district to create second-order changes. By studying the process of conceptualizing, producing, and employing a new shared vision within a school district, the research can center around the output of such a change in how the end-users are experiencing the district's direction. Through the lens of critical race theory, this research will also analyze the impact of IBL on Innovative USD's BIPOC community. Interviews will be conducted with district leaders, principals, and parents to gain insight into the progression of this systemic change and its impact on perceived student achievement. These interviews provided a better understanding of how a vision for the unknown impacts the classroom.

Research Questions

The following questions will guide this study:

1. How did this superintendent imagine, plan, and spread his vision for the future to other leaders within the district?

2. How did those leaders experience the vision, imagine the vision through planning, and transfer the vision throughout the district?

Significance of Study

This research sought to provide insights into the significant factors a district leader might encounter as they shift a school system's pedagogy. The study presents a potential implementation model from a 2.0 to a 4.0 organizational framework as it pertains to moving pedagogy to future andragogy practices. As a framework, the study will use Sinclair's (1998) concept of technology as experienced by historically disadvantaged families in the communities this district serves. Within this concept, a new technology (product or process) is the constructed value and impact in four phases: imagined phase, produced phase, employed phase, and experienced phase. This study will consider the pedagogical framework of IBL as a new process being implemented in a school system to examine the four phases adopted by Innovation Unified School District (Innovation USD, a pseudonym) in relation to its end-users. This study evaluated the successes and challenges of the planning process, communication, and implementation of the shared vision. The information will be valuable for other leaders who would like to move their districts into the fourth industrial style system.

Limitations and Delimitations of the Study

This study names institutional racism as a driving force in technology and constructivist learning due to the school system's factorization. This school system has significantly high concentrations of students of color, where its student population is 50% non-White. The limitation of this study is the lack of information on the impact of learning as perceived by families from historically disenfranchised communities. This lack must be addressed as findings

from this study will be used for school systems that cater to an even larger population of minoritized students and families in the future.

Definition of Terms

Artificial intelligence (AI): a type of computerized software programmed to perform tasks that normally require human intelligence, such as visual perception, speech recognition, decision making, translation between languages, and more. (Dictionary.com)

Automation: The use of largely automatic equipment in a system of manufacturing or other production process, which usually ends up replacing human labor (DMerriam-Webster.com, 2022).

Big History: Seeks to understand the integrated history of the Cosmos, Earth, Life, and humanity, using the best available empirical evidence and scholarly methods (Bighistory.com, 2022).

Constructivism: The theory that says learners construct knowledge rather than just passively take in information (Mehta & Fine, 2019).

Critical race theory: A socially constructed (culturally invented) category that is used to oppress and exploit people of color. Critical race theorists hold that the law and legal institutions in the United States are inherently racist insofar as they function to create and maintain social, economic, and political inequalities between Whites and non-Whites, especially African Americans (Britannica.com, 2022)

Economic Singularity: The point in which humans are massively unemployed due to the imbalanced rise in automation brought on by the adoption of artificial intelligence and machine learning capabilities (Chace, 2016).

Education 4.0: The adoption of new pedagogy in education that compliments the skills needed to compete within an industrial revolution 4.0 workforce . (Joshi, 2022).

Industrial Revolution: The rapid change in an economy marked by the general introduction and adoption of new power-driven machinery and new technological methods that create a more automated workforce (Merriam-Webster, 2022).

Inquiry-based learning: A teaching approach that emphasizes students' questions, ideas, and observation, thus moving toward a comprehension of content rather than fact memorization (Study.com, 2022)

Luddite: A person who opposes new technology or ways of working. (Dictionary.com, 2022)

Machine learning: The use and development of computer systems that can learn and adapt without following explicit instructions by using algorithms and statistical models to analyze and draw inferences from patterns of data. (Merriam-Webster, 2022)

Project-based learning (PBL): A type of inquiry-learning model in which students gain knowledge and skills by working for an extended period to investigate and respond to an authentic, engaging, and complex question, problem, or challenge (PBLWorks, 2022).

School stakeholder: Anyone who is invested in the welfare and success of a school and its students, including administrators, teachers, staff members, students, parents, families, community members, local business leaders, and elected officials such as school board members and city officials (The Glossary of Education Reform, 2014)

Singularity: A point at which a function takes an infinite value, especially in space-time when matter is infinitely dense, as at the center of a black hole.

Technological Singularity: A point in time in which AI and machine learning has surpassed human intellect in such a way to where it will change human history forever (Shanahan, 2015).

Technological Unemployment: Unemployment due to technological progress (Economics Help, 2022)

Technology: A new system, product, or process that changes the way humans work. (Sinclair, 1998)

End-user: The person who uses a particular product (dictionary.com, 2022). In this study, will be defined as one who is using the new type of pedagogy to disseminate a new style of learning, the learner (student), and the families that support student learning.

Organization of the Study

This dissertation is organized into five chapters. Chapter One provides an overview of the study, introduces background information to present the root causes of inequities among marginalized communities, and includes the terms used in this study. Chapter Two presents a literature review that uses critical race theory (CRT) as a lens to uncover the roots of inequities in the school system, an overview of fourth industrial work and globalization, the industrialization of the school system, the transfer of shared vision, and Innovation USD. Chapter Three will describe the methodology selected for this study, including samples and population selection, interview questions, and the procedures for data collection and analysis. Chapter Four will report the research findings. Chapter Five will include a summary of findings, implications for practice, recommendations, and conclusions. References and appendices are included at the conclusion of this study.

Chapter Two: Review of the Literature

The United States had many industrial revolutions beginning with the mechanization of water and steam in 1760, mass production using electricity leading to the first assembly line in 1900, then automation using digital electronics and information technologies in 1960 (Atanasoski & Vora, 2019; Bongomin et al., 2020; Bruun & Duka, 2018; Chace, 2016; Fiorelli, 2018; Joshi & Klein, 2018; Kurzweil, 2005; Metz, 2020; Perisic, 2018; Prisecaru, 2017; Wilson et al., 2017). During the various industrial revolutions, technology advancements shifted workloads away from human labor toward that which most historians call horsepower and machine automation (Armstrong, 2012; Bent, 1938; Mumford, 1932). In these various revolutions have been workers who fought against the profitable mechanization of work, led by a fictional British weaver named Ned Ludd (Simon, 2018). In 1779, Ludd supposedly “took a hammer to two stocking frames in a textile factory, smashing to bits the simple machinery which threatened his livelihood” (Simon, 2018). The story took hold across Britain as those who joined the Luddite Movement consisted of workers threatening capital interests by destroying machines of the Industrial Revolution. A contemporary Luddite is considered a person or group of workers actively fighting against the advancement of technology in their field. Simon (2018) suggested a good example of this type of worker would be the coal workers, given their refusal to reskill into green technology. According to Big History scholars, humans at no point will stop the progression of technology due to the current evolutionary trajectory as technology continues to evolve (Chace, 2016; Kurzweil, 2005; LePoire, 2021).

The purpose of this literature review is to properly frame the worldview of my research and ground this study firmly into my conceptual framework. Kotter (2012) stated that the first step in organizational change is to create urgency within the organization. To better understand

the urgency of our time, the first portion of the literature review frames human history in terms of technological advancement, evaluates the Fourth Industrial Revolution in terms of anticipated skills needed to gain access to the future workforce, conducts a global overview of how various countries are preparing their citizens for future work, and implications for other nations to consider as they follow suit.

The second portion of the literature review racializes the process of the industrialized school system to better understand the deep seeded mindset of leaders and teachers involved in the change process towards equity as it relates to correctly implementing pedagogical IBL methods. The use of CRT (Crenshaw, 1998) was used to examine the history of extracting and separating technology from enslaved Africans, embedding false narratives around contributions made by enslaved Africans to technology, and then systematically using the education systems to enclose immigrants and students of color into an industrialized workforce caste system still in effect today. According to Mehta and Fine's (2019) ethnography, schools that served more diverse students engaged in more rigid, coercive, direct instruction type of teaching, whereas schools that catered to mostly White affluent students used teaching practices that were more aligned with IBL practices. Curriculum standardization, systems and processes in the school system, and accountability instruments created organizational constructs throughout factorized education to create enclosures for historically marginalized students. The research will also show that even with CCSI, the United States is still not properly aligned with the current movement toward future work due to the pedagogical practices of teachers rooted in an education 2.0 framework which originally was aligned to the second industrial revolution (Darling-Hammond, 2015; Dintersmith, 2018; Mehta & Fine, 2019; Wagner & Dintersmith, 2018).

The third portion of the literature review will examine studies on how shared vision transfers within organizations, evaluate research on the successes and challenges tech-savvy superintendents have in managing change processes in their districts, and how businesses are using agile processes to better tailor their products to customer needs. The conceptual framework encompasses all elements discussed throughout the literature review to help guide the research design and findings.

Technology and Fourth Industrial Work

Speed of Technology

In the transition into the next industrial revolution, which is “the fusion of virtual, physical, digital, and biological sphere” (Bongomin et al., 2020, p. 2), most people outside of the technological field are not aware of how quickly technology is moving presently (Chace, 2016; Kurzweil, 2005; LePoire, 2015, 2021). Scholars of Big History review data trends of the earth from Big Bang to current trajectories by reviewing biological evolution, ecosystems, and social systems to develop and predict future scenarios. Table 2 reviews the changing evolution through energy change (technological advancements) in relation to transition years (LePoire, 2015). These transition years encompass each energy advancement from the beginning of evolution or time. According to the table, humans arrived around five million years ago and began social organization with the intent to hunt and gather. Each evolutionary change that has taken place based on energy transition has happened within half the time or less in history.

Table 2*Changes in Energy Flows Through Extended Evolution*

Transition (years ago)	Description	Energy change
15 billion	Gravitational	Gravitational energy causes clumping and nuclear energy causes energy to be release and element formation.
5 billion	Planet/life	Life first gathers energy through chemicals or thermal gradients. Later, the light from the sun is captured and turned into chemical energy.
1.5 billion	Complex cells	Simple prokaryotes form symbiotic relationships to form a larger and more organized eukaryote cell.
500 million	Cambrian	Oxygen levels reach a concentration so that multicellular organisms can be supported. The many body types and survival strategies lead to rapid evolution.
150 million	Mammals	Animals move to land after plants. The larger temperature variations lead to a way to regulate temperature to ensure ability to be active throughout the day and seasons.
50 million	Primates	A generalist strategy using various food sources including fruits leads to greater energy to the brain.
15 million	Hominids	Further generalist strategies and social organization again leads to greater energy use by the brain.
5 million	Humans	Humans adapt to a changing climate by leaving the forest for the savannah along with the capability for walking to expand the range of natural resources.
1.5 million	Speech	Further social organization leads to an expanded food sources including scavenging.
500,000	Fire	Fire improves the energy availability from food.
150,000	Ecoadaptation	Humans move out into other ecosystems expanding the range of energy resources.
50,000	Modern humans	The benefits of specialization and social organization are realized during the ice age.
15,000	Agriculture	Domestication of plants and animals leads to a more intense and reliable use of the land.
5,000	Civilization	Organization at a city level allows risk reduction and order with increasing population.

Transition (years ago)	Description	Energy change
1,500	Commercial revolution	Financial and mechanical technological techniques are applied and improved in a sustaining growth organization.
500	Science/ exploration	Exploration of lands and ideas leads to expanded energy resources.
150	Industrial	Fossil fuel allows large amounts of resources to be used along with increasing specialization.
50	Information	Control through systems and computers allows greater efficiency in the use of energy and handling of pollution.

Note. From “Interpreting ‘big history’ as complex adaptive system dynamics with nested logistic transitions in energy flow and organization, by D. LePoire, 2015, *Emergence*, 17(1).

(<https://doi.org/10.emerg/10.17357.dbe7c8d6fae7f082c4f33c5b35df8287>)

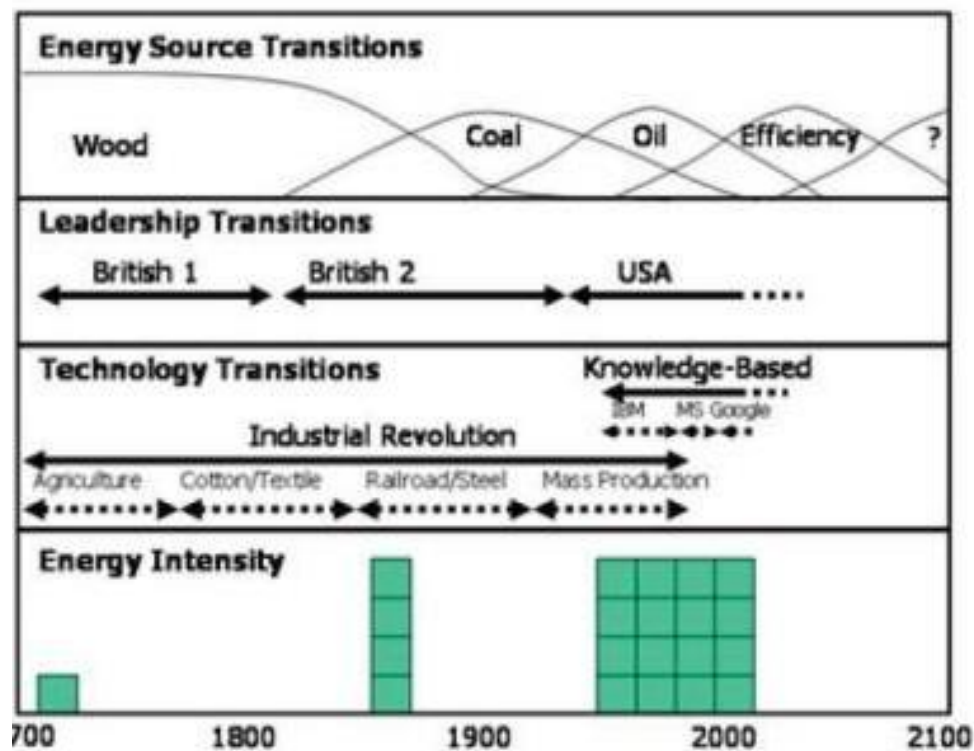
Figure 2 correlates the energy transitions with political dominance, technological advancements, industrial revolutions, and the energy disbursement by intensity per person in the leading nation during that time (LePoire, 2015). According to LePoire (2015), “human societies have undergone transitions toward more complex forms,” from agricultural societies to the current knowledge-based economy (p. 4). Implications from studying Big History forecasts situations either near utopia to near dystopia, citing

issues of great concern during this period include (a) the energy transition problem of moving from an unsustainable fossil fuel-based economy to something else; (b) the widespread nature of the problems currently being discussed in terms of global warming, global trade, global terrorism, and global knowledge transfer, and (c) the possible opportunities and risks of new technologies such as genetics, nanotechnology, and artificially intelligent computers and robots. (LePoire, 2015, p. 9)

Current research from LePoire (2021) concerns the global responses to the acceleration of technology, calling for governments to better prepare for the next evolution in technology by considering various forms of sustainability.

Figure 2

Energy Source Transitions Between Industrial Revolutions



Note. From “Interpreting ‘big history’ as complex adaptive system dynamics with nested logistic transitions in energy flow and organization, by D. LePoire, 2015, *Emergence*, 17(1).

(<https://doi.org/10.emerg/10.17357.dbe7c8d6fae7f082c4f33c5b35df8287>)

Bongomin et al. (2020) discussed that “thirty-five new disruptive technologies will exponentially digitally transform all areas of industrial processes and production in the world” (p. 3). The two main technologies that will drive change are AI and machine learning. Leading future technologist Kurzweil (2005) quantified the speed of technology by reviewing all of human history as it relates to technology, beginning with the first human tools. His law of accelerating returns discusses a doubling that has been happening from the beginning of human existence. We are now at the point where our technology will merge with the human mind, which he calls a technological singularity. Table 3 shows how quickly students in this generation will experience technological change. The left side of the chart delineates the actual human years of this century. The right side of the chart quantifies, in years, the technological advancements that will occur. The study of how fast technology is moving was first discovered through Moore’s Law (Chace, 2016; Kurzweil, 2005). A computer scientist noticed that the number of transistor pinheads on a microchip doubled every 2 years and that the cost of making computers was cut in half. Using Moore’s law of doubling and his own law of acceleration, Kurzweil (2005) predicted a point of technology merging with humans resulting in a technological singularity by 2032.

Table 3*Technological Acceleration Chart for the 21st Century*

Current years 21st century	Years of technological growth experienced during the timespan
2000–2025	100 years advancement
2026–2050	200 years advancement
2051–2075	300 years advancement
2076–2100	400 years advancement

Note. From *The Singularity is Near: When Humans Transcend Biology* by R. Kurzweil, 2005, Viking.

The impact of COVID-19 has accelerated the evolution process of technology development (Grinin et al., 2021; World Economic Forum, 2020). A key finding from the most recent Future Jobs Report from the World Economic Forum (2020) states, “The pace of technology adoption is expected to remain unabated and may accelerate in some areas.” Transitioning the world of business to online solutions increased the adoption of technology and created a need for more rapid development of technology. Grinin et al. (2021) described global trends of the 21st century in relation to political, economic, and technological advancements. The authors also confirmed that the speed of technology during COVID accelerated various global systems, as the prediction is that technological adoption increased due to a need for change, so the interconnectedness of globalization further advanced through the worldwide technological shift (Grinin et al., 2021). The denial of the speed of technological advancement in the United States, especially in the education system, will have disastrous consequences if not continuously and critically reviewed by leadership from all sectors.

Work in the Fourth Industrial Revolution

As technology is creating the next evolution of humankind, it will also fundamentally change the way humans work. Ray Kurzweil, a prominent technology futurist, predicts that the world should not worry about an economic singularity because the jobs will be replenished (Cass, 2012). A global study in 2017 explained the types of jobs AI will create in the future in three categories: AI trainers, explainers, and sustainers (Wilson et al., 2017). There is already a large sector of AI trainers being exploited in under-industrialized countries, such as India (Metz, 2020). Researchers who study the effects of a possible economic singularity are highly concerned with the growing inequities and even exploitation of those who are already marginalized in various countries (Atanasoski & Vora, 2019; Bongomin et al., 2020; Chace, 2016; Chelliah, 2017; Fiorelli, 2018; West, 2018). Atanasoski and Vora (2019) explained the Amazon Mechanical Turk Internet Marketplace (AMT) as a crowdsourcing software platform where employers post human-intelligence tasks (HITs), paying on average 3 cents per click, with the intention of training their AI intelligence systems. Since employers break the HITs into small tasks, large companies have acquired a global workforce of *turks*, bringing into question their users' racial dynamics and subjecthood, which is called the techno-liberal surrogate effect.

A more utopian idea of future work believes that AI will bring about such a rush of productivity that humans will no longer need to work, increasing leisure time to pursue living creativity (Bruun & Duka, 2018). Many theorists are now working with governments to propose an unconditional universal basic income (UUBI), providing stability to every individual irrespective of their position in society. This money would generate from corporations and businesses as a premium of doing business and an increase in property taxes. Bruun and Duka (2018) also compared UUBI as a shield to protect individuals against the negative aspects of

technological development but placed the development of skills as the sword that would allow countries to compete. One suggestion is to create an online portal that offers courses to develop relevant skills to help the current working generation transition their talents as AI disrupts their intended professions. The theorists also called for the restructuring of education to better prepare future generations, specifically focusing on skills rather than subjects, with an emphasis on a programming curriculum.

The fear of technological unemployment's impact on marginalized communities needs to be examined, as historically, the capitalistic nature of our country has always left these communities behind during periods of advancement. Van der Berg (2008) highlighted that one reason for relative poverty in many countries is the social constraints of marginalized populations due to not having proper connections to obtain higher-paying jobs even with a strong education. Foster (2016) noted that the primary reasoning behind the capitalist hijacking of education, which happened through George W. Bush's No Child Left Behind Act and Obama's Race to the Top reforms, was to benefit corporations, creating "a labor force of cheerful robots" (p. 42). Therefore, the breakthrough of artificial technology matched with robotic automatization will create a continuously learning employee who can work 24 hours a day, 7 days a week, without sick leave, medical coverage, or retirement benefits (Bruun & Duka, 2018).

In Demand Skills

Literature confirms that unemployment during each industrial revolution has always been a constant, mostly in the blue-collar sectors or even small departments within organizations (Chelliah, 2017; Ford, 2013). The difference between past revolutions and the Fourth Industrial Revolution is how technology causes enough technological unemployment to dismantle complete industries and careers while simultaneously creating what Cox (2020) described as a

new-collar workforce. Other researchers of technological unemployment usually study past trends from other industrial revolutions to predict this revolution (Chace, 2016; Fiorelli, 2018; West, 2018). Table 4 compares the largest companies in the United States in 1962 and 2017, which shows the decline in workers and how the automation of redundant jobs affected the workforce (West, 2018). According to the table, companies in 2017 were not only more profitable than those from 1962, but they also only employed one-fifth of the workers, a fallout from technological unemployment and globalization.

Table 4

Market Capitalization and Total Employees for Top Firms, 1962 and 2017

Largest companies	Market cap (in \$ billions)	Total employees
1962		
AT&T	20	564,000
General Motors	12	605,000
2017		
Apple	800	116,000
Google/Alphabet	679	73,992
Microsoft	540	114,000
Facebook	44	18,770
Oracle	186	136,000
Cisco	157	73,390
Priceline	92	20,000
Qualcomm	85	30,500

Note. From *The future of work: Robots, AI, and automation* by D. M. West, 2018, Brookings Institution Press. Copyright 2018 by The Brookings Institution.

There is a constant mantra in fourth industrial workforce literature that stresses the importance of acquiring skills over more formal educational credentials (Cox, 2020; Chelliah, 2017; Fiorelli, 2018; Ford, 2013; West, 2018; Wilson et al., 2017). van Laar et al. (2017, 2019, 2020, 2022) have done extensive literature reviews and empirical research on 21st-century work skills needed for the future workforce. After screening 1592 articles for which 75 articles were chosen to evaluate seven core skills (technical, information management, communication, collaboration, critical thinking, and problem solving) and five contextual skills (ethical awareness, cultural awareness, flexibility, self-direction, and lifelong learning; van Laar et al., 2017). Furthermore, researchers studied the determinants of 21st-century skills, finding that personality and psychological determinants were significant in research on creativity, critical thinking, problem solving, and collaboration skills (van Laar et al., 2020). The latest research centers on the skills in the current and rapidly changing workforce by reviewing “how 21st-century digital skills are currently understood, deployed, and developed to inform policies within organizations” (van Laar, 2022, p. 204). The main findings from this study emphasize how most employees are unaware of the digital skills needed for the 21st century. Even though organizations offer opportunities to upskill, current employees would need to self-identify their skill needs to take advantage of the training their employers offer. The implications for the current workforce should also be better understood in higher education and the K–12 education systems.

Education in the Fourth Industrial Revolution

The Digital Divide

Research surrounding the digital divide mostly begins with the invention of the computer in the ‘60s and focuses on the rise of the third industrial revolution, ushering in the digital age

(Chace, 2016; Kurzweil, 2005). Digital divide research began by introducing the digital divide as a variance between the *haves* and *have-nots* (Atanasoski & Vora, 2019; van Dijk, 2019), but more recently, more digital divide research is reviewing “the social split between people in a divided society” (Van Dijk, 2019, p. 123). Studies conducted in the Netherlands found that although 98% of the population had at-home internet access, there were still various barriers among the population, impacting the skills and outcomes internet access should have in a thriving technological society (van Deursen & van Dijk, 2015, 2019). Table 5 provides context on how the Netherlands and other countries need to grapple with the tension of having three digital divides and the indicators of how those divides create continual inequities in their societies.

Table 5*Three Digital Divides*

Divide level	Finding	Indicators
First digital divide	Relates to the purchase or access to digital devices, hardware, software, and internet	High percentage of population impacted by the lack of device and internet connectivity
Second digital divide	Relates to the various devices used (i.e., peripherals, and the ongoing expenses associated with maintaining the hardware, software, subscriptions, and consumables)	High percentage of the population lack the type of skills and uses of the devices and connectivity
Third digital divide	Relates to having an instructor teaching an individual how to use the technology in a way that will benefit the individual's life	High percentage of population lacks the outcomes achieved by having digital connectivity

Note. Synthesized from “The first-level digital divide shifts from inequalities in physical access to inequalities in material access” by A. J. van Deursen, & J. A. Van Dijk, 2019, *New Media & Society*, 21(2), 354–375. <https://doi.org/10.1177/1461444818797082>

The importance of technology usage was emphasized in another study where the researcher studied internet café telecenters in India to understand whether access to technology could end poverty (Toyama, 2010). The study found that “technology is only a magnifier of human intent and capacity” and widens the wealth gap (p. 120). Table 6 gives context around the finding and the reasoning and then aligns the information with the digital divide study. In the study, success in creating equity using technology occurs through the intent, motivation, and pedagogical practices of the teacher.

Table 6*Can Technology End Poverty?*

Finding	Reason	Divide level
Differential access	Technology must be fully sponsored to purchase, operate, maintain, and upgrade as needed.	Second digital divide
Lack of education, social skills, and social connections remain	If placed in a competition between someone with more access and social capital, a poor person is still at a disadvantage due to lack of education, lack of social ties, self-confidence in device/software, and technological organizational skills.	First digital divide
Differential motivation	The impact of how moderate to high-income individuals use their technology (i.e., upskilling and production mindset) is different than how poor people use their technology (i.e., gaming and consumption of technology).	Third digital divide
Lack of motivation from trainer	The impact of technology on poor people depends on the motivation of the person and positive or negative intentions of the people training them.	Third digital divide

Note. Synthesized from “Can Technology End Poverty?” by K. Toyama, 2010, *Boston Review*, 3(4), 119–127.

Hattie’s Impact on Education

Hattie’s (2012) extensive meta-analysis strengthens the claim that teachers are the most important factor, as their teaching strategies have the largest effect on student achievement. In the same study, Hattie showed that technology has zero effect on student achievement. As Hattie’s work moved throughout the education world globally, noted as the most comprehensive research on school effectiveness, school boards in the United States specifically opted not to adequately invest in technology, hardware and software upgrades, and teacher professional

development on technology, citing Hattie's section on technology effectiveness in student achievement (Belew, 2018; Lynch, 2018). The research does say that technology has zero effect on student achievement, but with the correct instructional methods, technology can accelerate student achievement outcomes (Hattie, 2012). One must also name that only quantitative data were collected and analyzed for Hattie's study, which begs the question of what student achievement really is.

Hattie's (2012) analysis was noted as outcomes-based in nature, but outcomes in most studies are measured through standardized testing. Many peer-reviewed articles also question student achievement via what instruments are used to measure it (Bergeron & Rivard, 2017; Kraft, 2020; Simpson, 2019). Overall, all literature on opportunities of the Fourth Industrial Revolution workforce specifically cites the importance of lifelong education, emphasizing problem solving, creativity, critical thinking, communication, and collaboration as cornerstone skills for successful transition and future longevity (Atanasoski & Vora, 2019; Bongomin et al., 2020; Bruun & Duka, 2018; Chace, 2016; Fiorelli, 2018; Joshi & Klein, 2018; Kurzweil, 2005; Mehta & Fine, 2019; Metz, 2020; Perisic, 2018; Prisecaru, 2017; Wilson et al., 2017).

Global Overview

To correctly frame where the American school system currently lies in the spectrum of preparing students for future work, many scholars, economists, and educational policymakers continually turn to the Organization for Economic Co-operation and Development (OECD) forum which is a collaboration of 37 countries developing policy standards on all economic growth (Davis et al., 2020; Jarvis et al., 2020; Schleicher, 2019). The Program for International Student Assessment (PISA) provides an international benchmark for how well industrialized countries train their students in literacy, math, and science (Davis et al., 2020). The United States

has consistently sat at 23rd in literacy, math, and science since the 1980s (Jarvis et al., 2020). A couple of countries that consistently dominate the PISA test are Finland and South Korea (Davis et al., 2020; Jarvis et al., 2020). Davis et al. (2020) highlighted Finland, which most recently began Phenomenal Based learning last year, and its national school system. At their schools, students get much play time, no homework, and no testing. Also, children go to school in their community because there are no private schools. Lastly, teachers are paid well. South Korea has advanced quickly over the last 50 years, starting with a 60% literacy rate and now being one of the top education systems in the world. Students go to school from 8 in the morning until 11 at night because they go from regular school to tutoring. They have a high school test that determines their employment future. South Korea has been trying to change its education system due to the high suicide rate among teenagers due to the pressure of school.

Research points to various national school systems trying to match the type of education their citizens receive to the Fourth Industrial Revolution. Most European countries have moved away from standardized testing and toward IBL, growth portfolios with co-created success criteria, goal orientation, and feedback loops at all levels. Many have moved away from grading because as we move into the next revolution, education is going to be decentralized, and students will need to be very agile as the job market is going to shift constantly. As technologies grow stronger, there will not be as much need for large workforces, and students will need to be specialized in their learning endeavors. Malaysia, for example, named its educational system Education 4.0 and mostly concentrates on technology outcomes.

China just released its Informatization 2.0 for education, focusing on teaching technology (i.e., cybersecurity, blockchain, fintech, machine learning, and biotech) starting in kindergarten. When the recent COVID-19 pandemic shut down schools, China was ready with the national

slogan, “School’s Out, But Class On” (Zhou et al., 2020). By March of 2020, China’s Ministry of Education coordinated a curriculum on fighting epidemics to focus on epidemic prevention knowledge, life education, public safety education, and mental health education. Coordinating online learning with students’ actual needs helped to prevent normal teaching methods, shortened time in class, and strengthened study guidance. The country created air resources for local and national learning hubs using networked cloud platforms. It also provided a backbone for teachers to network on coordinating course recording sessions, resource provisions, online teaching guidance, and online home-school communication to help families with online guidance, questions, and communication. Additional protocols for uniform implementation of online learning were not requiring families to print out lessons (causing financial burdens on families), not recording lessons to reduce burdens on teachers, and not requiring students to “clock in” to upload videos daily.

A lesson learned from Akgül and Ayer’s (2020) study on the Ministry of Education of Turkey is that school systems must first move their educational systems from an Education 2.0 model of learning to a 3.0 model prior to moving to Education 4.0 (Akgül & Ayer, 2020; Hattie, 2012). The recommendation for school systems to move from a 2.0 system of learning is that they “must have roadmaps in place to develop infrastructures, technology and human capital with information technologies to partake in the benefits that Industry 4.0 has to offer” (Akgül & Ayer, 2020, p. 164). According to the study, these are the challenges Turkey struggles with when moving toward an Education 4.0 framework:

1. Education policies should develop educational programs suitable for the change in information technologies.

2. Due to fast changes in technologies, children through adults partake in continuous learning activities.
3. Education should move away from basic memorization and based on researching subjects and events more in-depth.
4. Problem-based learning and increased levels of participation in problem-solving activities when there are not enough persons to solve the problems on-site.
5. Educational environments should be prepared for individuals to evaluate, think freely, discuss and investigate the problems they face.
6. Multidimensional mind development should be targeted, not just verbal and numerical communication.

These findings correlate with various studies on technological 1:1 implementation research providing evidence of having a strong pedagogical output prior to technology enhancements to facilitate deeper learning experiences (Bednar et al., 1992; Demir & Onal, 2021; Fullan et al., 2018; Hattie, 2012; Pittman & Gaines, 2015; Reid, 2014). This section gives a global outlook as to how other nations are working toward adapting their national education systems toward embedding skills for future industrial revolutions.

United States of Common Core

In 2009, the National Governors Association (NGA) and the Council of Chief State School Officers launched the CCSSI to set uniform national academic standards for math and English language arts from Kindergarten through Grade 12 (Common Core State Standards Initiative, 2020; Jochim & Lavery, 2015; Lee, 2020). Due to states having local control over education policies, minimum academic achievement standards varied. Therefore, the federal government created an opt-in education policy to move states toward a common national set of

standards. What triggered this level of participation from corporations began with the release of *A Nation at Risk* (National Commission on Excellence in Education, 1983), which showed how Americans were falling behind in the world academically, launching the school reform movements tied solely to high stakes testing (Milner & Lomotey, 2014).

Throughout the years, from the emergence of state standards to President Clinton's Goals 2000 bill to the linking of Title 1 funding to the adoption of state standards and the rise of high-stakes testing through the No Child Left Behind Act, educator voices were intentionally locked out of the development of education reform policies (Cross, 2004; Shober, 2016). Foster (2016) discussed how the CCSSI was nothing more than a corporate take-over of the education system because the NGA and the quasi-governmental CCSO were guided by business entities and standardized testing lobbyists who wanted to cripple the unions by tying teacher longevity to high-stakes testing.

In August 2009, the Association for Supervision and Curriculum Development (ASCD) wrote an open letter against the state adoption of CCSSI and created a commission that evaluated the CCSSI (ASCD, 2020). By March 2010, the ASCD commission approved the standards policy position and, by May 2010, became endorsing partner. In March 2011, the ASCD received a grant from the Bill and Melinda Gates Foundation to support educators' understanding and implementation of CCSSI. Other grants, such as from the Leona M. and Harry B. Hemsley Charitable Trust, gave the American Federation of Teachers (AFT) union an \$11 million contract to build an online warehouse of instructional tools to support standards implementation (Jochim & Lavery, 2015). By 2013, AFT leaders cited how quickly CCSSI rolled out and how it needed a course correction in its legislation due to how closely the new national standards were tied to high-stakes testing and causing harm to educator evaluations.

With high stakes testing being the determination of student achievement, designation of school performance and closure, and now teacher/administrator evaluations attached to the CCSSI, the harm to educators is, in turn, causing harm to students through educator teaching methods. The lack of placing money into correctly training educators on the teaching methods of the CCSSI thwarts the goal of efficiency.

According to a National Public Radio report, as schools closed in March 2020, school districts in the United States rushed to get technology and internet access to move families toward online education (Kamenetz, 2020). Teachers were asked to use Google Classroom to post digital lessons and worksheets for students to continue their education. Unfortunately, online learning is not as simple as placing students online to learn. Several studies attribute negative online learning experiences to the lack of understanding of how to operate devices (Escueta et al., 2017; Okwumabua et al., 2011). News agencies reported that as of April 10, 2020, only 59% of all high school students participated in studies online, with reasoning correlating with known research on digital 1:1 implementation research and how families adapt to online learning environments (Kamenetz, 2020). These reports again beg the question of where Black people are in this utopian future world of technological prosperity where everyone is supposed to have more leisure, thus giving humans more time for creativity. This has never happened in the past, and as evidenced by COVID-19, we can see which students are not prepared to live in this utopian future.

United States of Industrialized Schools

Due to the lack of technological historians that specifically research and document incidences of racialized injustice (de la Peña, 2010), this research used a CRT lens as an appropriate methodology for examining how technology impacts race in the school system

(Crenshaw, 1989). In this case study, students of historically marginalized communities have been impacted by the intersectionality of technology and race, advanced by the social constructs built upon false narratives of ancestry, enclosed by laws and policies meant to enclose enslaved Africans prior to and before Emancipation, through the industrialization of schools to help “civilize” immigrant populations, and lastly through the enclosures of testing and accountability. Just as future theorists understand past trends in society to predict the future trajectories of society, researchers must take a step back and review how historically marginalized communities have been devalued in Western society during past industrial revolutions, work, and education. Although the technology industry tries to distance itself from race issues altogether, de la Peña (2010) placed a call to action for more historians to “regard race as inextricably linked to the history of technology in the United States” (p. 921). This literature review will connect teachers’ mindsets as they instruct students of color. As stated before, it is the mindset of all educators, along with policies, that will shift our education system toward IBL practices to give all students access to future work opportunities.

Mechanicalization of Humans

The literature highlighting the reasons behind today’s industrialized school system does not begin with the alignment of the Second Industrial Revolution for Black students as originally thought (Darling-Hammond, 2015; Dintersmith, 2018; Wagner & Dintersmith, 2015). The literature confirms that the Black experience with technology begins from antiquity and the beginning of the human experience, extracted during colonization in the Americas and then separated through the systems and laws placed to keep Black people as second-class citizens during each industrial revolution (Armstrong, 2012; Carney, 1996; Ekolū, 2017; Lewis & Mumford, 1934; Sinclair, 1998; Trotter, 2000). The importance of researching this portion of

history using a CRT lens is to connect the deep-seated social constructs that have burdened students of color in the educational system to the eugenic testing culture of the United States and the deficit narrative of an achievement gap.

The Extraction and Separation of Technology

Technology continually absolves itself from its connection to slavery through the false narrative of the distance between technology and marginalized communities that lack access to technological devices, services, and digital skills. When discussing the overall progress of humans with technology, Big History scholar, LePoire (2015) posited,

Once societies were freed from depending on slave labor as in ancient civilizations, there was more motivation to explore mechanical and energy extraction to help reduce physical efforts, leading the West to utilize water, wind, and wood along with mechanical machines. (p. 10)

The transfer of labor from slave labor to mechanical labor has been acknowledged in the literature as the beginning of the first industrial revolution, which began in Britain, but the first industrial revolution in the United States began in 1794 with the invention of Eli Whitney's Cotton Gin (Armstrong, 2012; Bongomin et al., 2020; Chace, 2016; Fiorelli, 2018; Joshi & Klein, 2018; Trotter, 2000). More importantly in the entanglement of technology and slavery is the importance of the social construct of human servitude, the importance of extracting technology from African slaves in the United States to build a new nation (Trotter, 2000), and the separation of technology from enslaved people through systems and laws, which set the stage for notions of Black student achievement as inferior.

Technology, invention, and design are intertwined with African civilization through binary code, geometrical mathematics, and calculus from the beginning of human history

(Eglash, 1999; Ekolu, 2017). Eglash (1999) uncovered various geometric patterns while flying over African cities and found high levels of geometric calculus organization called fractals. After extensive research, he found that African fractals are indicative of only African civilizations, that infinity leads to iterative practices of design that are intrinsically embedded in African production and social design, and that there is evidence that sources for European fractals were of African origin. Eglash also discussed the dismissal of African fractals in architecture due to a Western perspective placed over African accomplishments citing the praise for the city structure of Timbuktu due to the use of westernized Cartesian grid style layout, Yoruba cities of equal stature were dismissed as giant villages and considered primitive due to the lack of Cartesian design which also helped solidify colonial proof of primitivism in the Western world. The primitivism of western knowledge in complex mathematics and ways of knowing, reducing the complexity of iterative design down to Western linear perspectives as a way to justify White supremacy practices against Africans, needs to be more robustly researched and called out in technological history. Ekolu (2017) specifically calls for more research on how ancient African technological advancements, scientific advancements, and engineering practices need to be integrated into African STEM curricula as it is currently based on European standards, citing, “Cognitive abilities of Black Africans have been questioned, sometimes through unsubstantiated eugenic theories and scientific methods” (p. 3). Table 7 underscores the various scientific and engineering discoveries from the African diaspora, some even prior to the pyramids of Giza, impacting various fields of design and technological expertise (Ekolu, 2017).

Table 7

Summary of Some Early Scientific and Engineering Discoveries of Ancient Africa (10–14)

Discipline and scholarship	Discovery	Location	Dating	Reported by
Materials engineering and technology	Production of carbon steel	Tanzania, Uganda, and Rwanda	1500–2000 years ago	1978: Prof. Peter Schmidt, professor of engineering, and Donald Avery, Brown University
Astronomy	A stone calendar based on rising of certain stars and constellations	Kenya, edge of Lake Turkana	300 BC	1978: Dr. B. M. Lynch and Prof. L. H. Robbins. Michigan State University, USA
	Astronomy in ancient Egypt divided a year into 12 parts and produced a yearly calendar of $325\frac{1}{4}$ days.	Egypt	3000 BC	
	Dogon of Mali have had precise knowledge of the invisible Sirius B star for hundreds of years.	Mali, about 200 miles from Univ. of Timbuktu	500–700 years ago	
Mathematics	The earliest recorded use of algebra was among the Egyptians.	Egypt		
	A numerical counting system named Ishongo had developed a lunar calendar system.	Zaire (now Democratic Republic of Congo)	20000 years ago,	1960: Dr. de Heinzelin. Universities of Ghent and

Discipline and scholarship	Discovery	Location	Dating	Reported by
				Brussels, Belgium
	Yoruba of Nigeria has a complex number system of counting of base 20.	Nigeria	Native	
Architecture and mega engineering projects	The 80 Egyptian pyramids present an astounding marvel of any engineering project in human history.	Egypt	2560 BC	Great pyramid of Giza
	Monomotapa, a large stone complex found 17 miles south of Zimbabwe's city of Nyanda, an empire of Shona people, existed for 300 years.	Great Zimbabwe	800 years old	
Navigation and overseas travel	Mali and Songhay empires had reed-built boats used to sail across the Atlantic to South America and China.	West Africa	13 th century	
Agricultural science	Barley cultivation	Pre-Egyptian age, Nile banks	18000 years ago	1979: Prof. Fred Wendorf, Southern Methodist University, USA
	Cattle domestication	Kenya highlands	15000 years ago	1980: Dr. Charles Nelson, University of

Discipline and scholarship	Discovery	Location	Dating	Reported by
Medicine	African traditional medicines, including early uses of antiseptics, vaccination, anesthetics, and surgery, among many others Caesarean operation natively conducted by Banyoro of Uganda	Mali, Nigeria, Liberia, Kenya Uganda	 Native	Massachusetts, USA Dr. Charles Finch, Morehouse School of Medicine, USA. Reported in 1879 by Dr. Felkin [13]
Scholarship	University of Timbuktu in Mali is considered one of the world's first universities. Founded in 980 AD, it had about 25000 students in the 12th century.	Mali	980AD	

Note. From *On modern technology diffusion and ancient science in Africa* by S. Ekolu, 2017, European Alliance for Innovation. <http://dx.doi.org/10.4108/eai.20-6-2017.2270658>

African civilizations have extensively contributed to mankind's advancement by advancing scholarship, scientific knowledge, mathematical knowledge, technology, and design. One notable advancement correlated in literature is the superior design of the African smelting process, which produced higher-quality steel, but transportation issues of wood, charcoal, and

iron made the European lower-quality iron more economically competitive (Austen & Headrick, 1983).

Colonization brings a new depth of knowledge to this study as it relates to the connection of slavery in the extraction of technology, as enslaved Africans brought a wealth of technological knowledge to the United States that even led to the first American industrial revolution (Armstrong, 2012; Carney, 1996; Trotter, 2000). From an African perspective, it was not until the industrial revolution that “there was little or no technology transfer among past civilizations” (Ekolu, 2017, p. 461); thus, the advancement of indigenous scientific knowledge disappeared once the civilization was conquered. Research suggests the importance of extracting technological expertise embedded in the agricultural technologies of the United States (Carney, 1996; de la Peña, 2010; Sinclair, 1998; Trotter, 2000). Carney (1996) specifically compared the rice cultivation process in West Ghana to the rice regions in South Carolina and Georgia, for which “abolition doomed the rice plantation system by liberating some 125,000 slaves who grew rice along nearly 100,000 acres of coastal plain,” creating a lucrative plantation economy (p. 5). According to research, the 550 planters long held a narrative that Africans were merely unskilled labor, which was debunked in the 1970s by scholars who found that enslaved Africans were highly skilled in rice planting, which contributed to agronomic expertise, techniques developed for soil and water management, and land management. Carney (1996) found that the West African system of rice cultivation, independent of the Asian system, had various innovations, which the research attributes to European integrated systems, but the research had no proof that compared European ditch systems, for example, to specifically make a solid correlation with European water management and land management systems. Further,

the technical changes marking the evolution of the colonial rice economy illuminate three issues that bear on comparative studies of technology and culture: first, the need in cross-cultural analysis to examine the technical components of production as part of integrated systems of knowledge and not merely as isolated elements; second, the extent to which superior social status coincides with a superiority in knowledge; and third, the relationship between technical expertise, patterns of labor utilization, and technological change. (Carney, 1996, p. 22)

The need for research on integrated systems of knowledge in the United States during colonialism is highly important for examining how African fractal technology (Egash, 2005) of iteration and design have been implemented through the inventions and designs of the enslaved African American workforce.

The planter population in the South advanced stories on the cultivation of the prosperous rice economy during colonialism as narratives of ingenuity, grit, and technological dominance, declaring that enslaved Africans did not contribute anything but the unskilled labor to create the American Dream (Carney, 1996; Sinclair, 1998). According to Trotter (2000), false narratives around the technological advancements in colonial history displaced enslaved Africans' technological expertise in favor of American ingenuity. The invention that transformed American society and gave the country access to the First Industrial Revolution, Eli Whitney's cotton gin, was actually an invention of a slave on a plantation where Whitney worked (Du Bois, 1924). Where Whitney thought that the invention would assist in ending slavery (Armstrong, 2012), the cotton gin soon catapulted the United States onto the national scene as a global powerhouse, extending slavery for another century.

In addition to the false narratives that erased enslaved Africans as key partners in American technological ingenuity, literature also confirms a belief that slaves were simply machines and extensions of the master's body, explaining the logic behind Western interpretations of slave labor and industrialized labor overall (Armstrong, 2012; Sinclair, 1998). Armstrong (2012) wrote a detailed analysis of written literary works to help clarify the logic of slavery. The driving question derived from psychoanalyst Hann Sach's paper, which attempted to explain "why Greeks and Romans had math and science but no real mechanical culture." Slavery and the logic of the "machine within the machine" was the concluded reasoning behind why civilizations, including the American South, did not advance in mechanical technology until the first industrial revolution. Table 8 is an outline of the in-depth descriptions from literature throughout history that correlates with this logic.

Table 8

The Logic of Slavery: Debt, Technology, and Pain in American Literature

Era	Literature	Slaves as machines
Antiquity	Aristotle	A slave is a slave naturally and a master is a master. The slave actions are an extension of the master's will and the slave doesn't have an independent existence. Thus, the slave is in a sense a part of his master, a living but separate part of his body. Slaves belong to the world of repetitive labor and consumption instead of production and making. As an extension of the master confirming the master's power and locates that power close to his body in the household where a freestanding machine might arise as potential independence of the slave, undermining their status as an instrument.
	Technology philosophers P.M.	Argued that only the abandonment of slavery does the stimulus of labor become intense.

Era	Literature	Slaves as machines
First industrial Revolution	Schuhl, Andre Aymard, Marc Chapiro	Laborers, instead of capitalists, create inventions to lower their workload. Labor substitution is essential to technological interventions.
	Geral Piel	Slavery is the underpinning of high civilization until most recent times. Slavery was abolished only when the biological energy of man was displaced by mechanical energy in the industrial revolution and became immoral when it became technologically obsolete. Machines and inventions' primary purpose was to achieve a mechanical way of life to have power over other men. Though nominally designed to further the means of existence, the machine served the industrialist, the inventor, and all the cooperating classes as an end.
	Lewis Mumford	Stressed in 1934, "Before inventors created engines to take the place of men, the leaders of man had drilled and regimented multitudes of human beings: they had discovered how to reduce men to machines. The slaves and peasants who hauled the stones for pyramids ... the slaves working in the Roman galley... these were all machine phenomena."
	Armstrong, referring to abolitionist literature and pro-slavery literature at the time.	Abolitionists, along with inventors, were bent on replacing slave labor with machines to grant freedom to slaves. Where pro-slavery writers rebutted the argument pointing out the mechanization in the North and UK produced system of subordination labeled "industrial slavery," but the South provided life-long care."
	Governor of Massachusetts 1837	British steam power was equivalent to 1 million workers.
	Frederick W. Taylor	Described how an educated ape as the best factory worker in the system.

Era	Literature	Slaves as machines
Second Industrial Revolution	Senator Vardaman	A negro may become an obedient effective piece of machinery.
	Marx	Depicts humans as instruments
	W.E.B. du Bois, Talented Tenth	Rejected the equation of worker and machine Attacked the relation as “uncanny and retrogressive” in its mechanization of the subject. Ultimately leaves in place the operative relationship informing the slavery-technology complex, siding with mastery (accomplishments of the college-educated) and seeing slavery and the tool bound together.
	Booker T Washington, industrialized negro	We are the machine within the machine. Internalized the logic of the tool Washington refuses the master-slave, intellect-tool dynamics of slavery which involved a strategic down-valuing of academic study.
	Mary King Sherman, president of the Federation of Women’s Clubs in 1926	Housewives must come up from slavery.
Slave power versus horsepower, rise of production instruments	Silas Bent, major technology historian	He questioned if Americans were on a higher plane than Greece standing on the backs of Helots, Rome standing on the backs of captured military, or southern planters standing on the backs of Black slaves. Book <i>Slaves by the Billion</i> predicts that future generations will “attain once again the ideal ancient Greece civilization with the difference that it will be shared by many instead of the few, because it will be borne by mechanism, not human slaves.”

Era	Literature	Slaves as machines
		Women will not be released from servitude as they will need to direct the household: “The leisure and culture of the plantation was confined mostly to the males.”
		Robot rebellion represents the final extension of autonomy of the technological which he fears = the uncanny substitution which becomes total, freed from human will, but marred by the status of being an extension of the human.
		The constant measurement between horsepower, slave-power, and machine-power measuring units.
		Measuring in units, he created an equation: A mechanical horsepower costing \$20–\$50 per year equated to 10–15 human slaves.
		The billion horsepower in automobiles = 10–15 billion slaves many times more people on the planet.

Note. From *The logic of slavery: Debt, technology, and pain in American literature* (Vol. 163)

by T. Armstrong, 2012, Cambridge University Press.

(<https://doi.org/10.1017/CBO9781139177252>)

In the table is the recurring theme of past industrial revolutions connecting a pattern of servitude in the form of a machine. This thought process embedded in Western culture gives a possible mental authority over the ownership of intellectual property in the United States. Trotter (2000) again posited that there was a separation of technology from enslaved Africans throughout the rise of the industrial revolutions, and the result is manifested in the present digital divide in society today. The invention and success of the cotton gin gave rise to the demand for raw cotton, placing more displacement measures among the Black population, an increase in

more Black enslaved labor, and more emphasis on the labor power versus technological knowledge of Black labor (Sinclair, 1998; Trotter, 2000). Subsequently, various policies and laws systematically separated enslaved Blacks from the invention process:

Federal, state, and local authorities also enacted policies aimed to reinforce the separation of blacks from technical expertise. Following Nat Turner's rebellion in 1832, southern states and localities outlawed the teaching of blacks to read, write, and cipher. Since the U.S. Patent Act of 1836 required inventors to submit models showing the precise construction, design, and specifications of their innovations, literacy restrictions denied African Americans significant channels to technological knowledge as well as patents for their inventions. Moreover, following the U.S. Supreme Court's Dred Scott decision of 1857, the federal government ruled that bondsmen were not citizens of the republic and therefore could not receive patents for their inventions. (Trotter, 2000, p. 20)

The literature subsequently suggests the separation of technology continued throughout each industrial revolution after enslavement, the formerly enslaved population of workers were not fully accepted into the workforce, but instead, with each technological advancement, the formerly enslaved were given more work to keep up with production, the most dangerous work, or no work (Sinclair, 1998; Trotter, 2000). To correlate this research with Marxist theory, Pierce (2015) described how capitalism divided the working-class population into four competing categories: the floating (disposable), the latent (peasants), the stagnant (most exploited), and the lumpenproletariat (criminals), called the Marx's surplus population.

Factorization of American School Systems

Literature suggests an alignment of the American education system with the Second Industrial Revolution (Darling-Hammond, 2015; Dintersmith, 2018; Edson, 1978; Tyack,

Wagner & Dintersmith, 2015). Standardized education began with the Common School Movement (Tyack, 1974) in the 1800s, followed by The National Education Association's Committee of Ten in 1893, chaired by Harvard University's president Charles W. Eliot, which created standardized learning for each educational discipline (Edson, 1978; Wagner & Dintersmith, 2016). According to Edson (1978),

Between 1890 and 1920 new high schools opened on the average of over one per day, a 467% increase for the 30-year period. Likewise, nationwide student enrollments increased by 812% compared to a population increase during the same period of only 68%.

Concurrently, there was an outcry from scholars and the public to begin aligning student standardization with vocational education due to changes in the nature of work (Dintersmith, 2018; Edson, 1978; Wagner & Dintersmith, 2015), so high schools had vocational and scholarly tracks supervised by various college elites who created the standards for graduation and entry into college. According to Edson (1978), architects of high schools did not want to maintain two types of high schools with different administrators. Thus, high schools hired more administrators and career counselors to track students toward vocation or college. According to Wagner and Dintersmith's (2015) review of each subject from The Committee of Ten's standards, the students on the vocational track were to work in the factories of the Second Industrial Revolution, making the United States an educational and economic leader worldwide.

Table 9*The Alignment of the School System With the Second Industrial Revolution*

Actors	Factorization instrument	Industrial alignment
Second Industrial Revolution	Agencies separated the insane into asylums, the poor into almshouses, and the criminal into prisons.	Reformers created institutions to bring order into deviant persons' lives.
	The young were taken from the rest of society for a portion of their lives and separated into schools.	Students were expected to learn order, regularity, industry, and temperance and obey and respect their superiors under a central administration.
	Followed the exact schedule and military routine.	Schools were to counteract or compensate for indulgent or neglectful families.
Herbert Gutman	“Precision, accuracy, implicit obedience to the head or directive power, are necessary for the safety of others and for the production of any positive results.”	The urban “school performs this so well,” he remarked, “that it reminds some people unpleasantly of a machine.”
	“[The student] was properly socialized to the new modes of production, attuned to hierarchy, affective neutrality, role-specific demands, extrinsic incentives for achievement.”	“Educators argued that the educated worker made a better employee, it did not simply mean that he could read directions or was less likely to drink whisky or go out on strike.”
Boston School Committee 1889 and Connecticut Board of Education	Justifying the use of corporal punishment in schools in immigrant wards	Due to the increase in immigration, the school system sought to control

Actors	Factorization instrument	Industrial alignment
Herbert Spencer	The specialization of function	Considered “the characteristic product of modern civilization”

Note. From *The one best system: A history of American urban education* (Vol. 95) by D. B. Tyack, 1974. Harvard University Press. Copyright 1974 by Harvard University Press.

Accountability

Current education research focused on the achievement gap, and the lack of 21st-century skills on students’ future work prospects centers around the standardization of testing, high-stakes test reforms, and the impact these reforms have on students’ ability to learn according to their interests. This review seeks to explore the possibility that the achievement gap, though existent, is not as it seems. Part of the reason American education cannot provide students with the desired skills is that the system is focused on perpetuating and enforcing the current social caste system more than it is focused on educating our children. The systematic oppression and socialization of marginalized communities in schools can be seen in the use and misuse of high-stakes testing.

Myrdal (1944) identified and explained the social caste system in detail. Samad (2009) explored this research to identify that the American education system is an extension of the social caste system. Samad argued that the racial privilege afforded to White people and deprivege cast upon Black people have allowed educational disparities to continue. Such disparities in the United States social arena are perpetuated through limiting educational opportunities and, in extreme cases, an outright denial of education for Black children (Bush & Bush, 2018; Spring, 2016).

The term “high-stakes” is used to describe tests that have a direct impact on a person’s life opportunities (Moses & Nanna, 2007). High-stakes testing can be traced as far back as the 1920s and the development of the Scholastic Aptitude Test (SAT) by United States psychologists, including eugenicist Carl Brigham (Au, 2013). High-stakes tests like the SAT often result in a chain of educational and social events that determine a student’s social position (Moses & Nanna, 2007). With No Child Left Behind legislation, President George W. Bush’s 2002 reiteration of the Elementary and Secondary Education Act, high-stakes testing moved into the K–12 arena (Cross, 2004). Additionally, President Barack Obama’s Race to the Top initiative continued the push for testing as the accountability measure to determine funding, even for the United States’ most marginalized schools (Au, 2013). Our testing system is ingrained in society, and parents will need to be major partners in societal change and advocate for this better system of education.

Considering high-stakes testing as a post-colonial apparatus in the school system, school reformers have essentially established policies among communities of color that confirm the colonial status quo (Heilig et al., 2013). To counter the pedagogy that accompanies the schooling of students in marginalized communities, Freire (2000) suggested the problem-posing framework, which allows students to bring their cultural competencies, worldviews, and a wealth of knowledge into the classroom. There is still an element of hegemonic power that controls the actual deep learning outcome because it is anchored in the popular goal of increasing standardized test performance (Condliffe et al., 2015; Kingston, 2018).

Kingston (2018) produced a comprehensive literature review evaluating PBL empirical articles spanning over 30 years to consider if PBL practices had improved student test scores. The study found that most studies point to PBL being promising due to the high increase in

problem solving, creativity, and critical thinking (Condliffe et al., 2015), but found “PBL effect on standardized testing to be unsubstantiated” (Kingston, 2018, p. 2). Honoring the power of problem-posing learning releases teachers from the “banking system of learning” (Freire, 2000, p. 72) and creates a co-learning relationship between students and teachers. There is no way to measure deeper levels of learning (Dintersmith, 2018; Wagner & Dintersmith, 2016); thus, we must focus on linking projects’ success criteria to the impact on community through student self-agency.

School leaders and instructional teams play a pivotal role in creating equitable learning environments and authentic learning experiences for our students. Accountability should not rest in standardized scores or curriculum practices (Heilig et al., 2013). Embracing the tenets of community-based accountability to disrupt the colonial paradigm in urban schooling experiences is imperative to empower historically marginalized communities to exercise their democratic power, set new ways of defining student achievement, and become agents of change in their schools, communities, and world (Heilig et al., 2013). Transforming how teachers instruct and define achievement while tailoring instructional practices to engage children in meaningful learning, preparing them to be lifelong learners, and shifting understanding and practices to an evolutionary model is aligned to fourth industrial research models (Fullan et al., 2018). To catalyze this change in practice and theory, it is critical to provide teachers with high-quality job-embedded training to develop their capacity to implement principles of IBL in theory and practice.

Parent communities must refuse standardized testing as a summative assessment and consider its impact on perpetuating the deficit models of instruction, particularly for historically marginalized students and communities. True to its eugenic foundations, standardized

assessments continue to serve their purpose of enclosing historically marginalized communities, pre-determining their trajectories by defining students' perceived future social roles (Kliebard, 2004).

Furthermore, since standardized testing will be removed as an accountability measure, it should be replaced with an evaluation of the community impact of the school and students' projects. Heilig et al. (2014) contended that communities should set their own goals for students based on community accountability. Other countries have deprioritized high-stakes testing as a validating marker of success and moving toward goal-oriented feedback, growth portfolios aligned with success criteria, and rubrics (Cohen & Singh, 2020; Shute, 2008). Additional research may also pave the way for professional development opportunities that engage school-level leadership in redefining authentic learning and developing ways to catalyze community-based accountability.

Shared Vision

The following articles disseminate information on shared vision. The first portion of this section will discuss the organizational change management theories of Kotter (2012) and Fullan (2011, 2016), which are considered common models of change in businesses and school districts. Agile business models will be discussed as well to give context as to how business models can change using design thinking models. The second portion of this section will focus on the transfer of shared vision, relying on empirical studies focused on second-order change initiatives, to what it takes to lead technology from a district office to the school sites. The last portion of this section will focus on the changing role of superintendents in school districts, reviewing literature focusing on the challenges and successes of savvy superintendents, which will lead to a final discussion on my conceptual framework.

Organizational Change Management

Traditional

The conceptual framework for this study begins with the first step in Kotter's (2012) eight-step process for organizational change: creating a sense of urgency in an organization. The previous two sections of this literature review help frame the need for educational organizational change in the United States as it relates to a pedagogical shift toward IBL practices. Figure 3 highlights the change process using Kotter's eight steps. Kotter also discussed the need to adapt to the constant changes in the globalized market. Businesses that are not changing will face major challenges, including advanced technological change:

A globalized economy is creating both more hazards and more opportunities for everyone, forcing firms to make dramatic improvements not only to compete and prosper but also to merely survive. Globalization is being driven by a broad and powerful set of forces associated with technological change, international economic integrations, domestic market maturation within more developed countries, and the collapse of worldwide communism. (Kotter, 2012, p. 20)

Figure 3*Kotter's Eight-Stage Process to Creating Change*

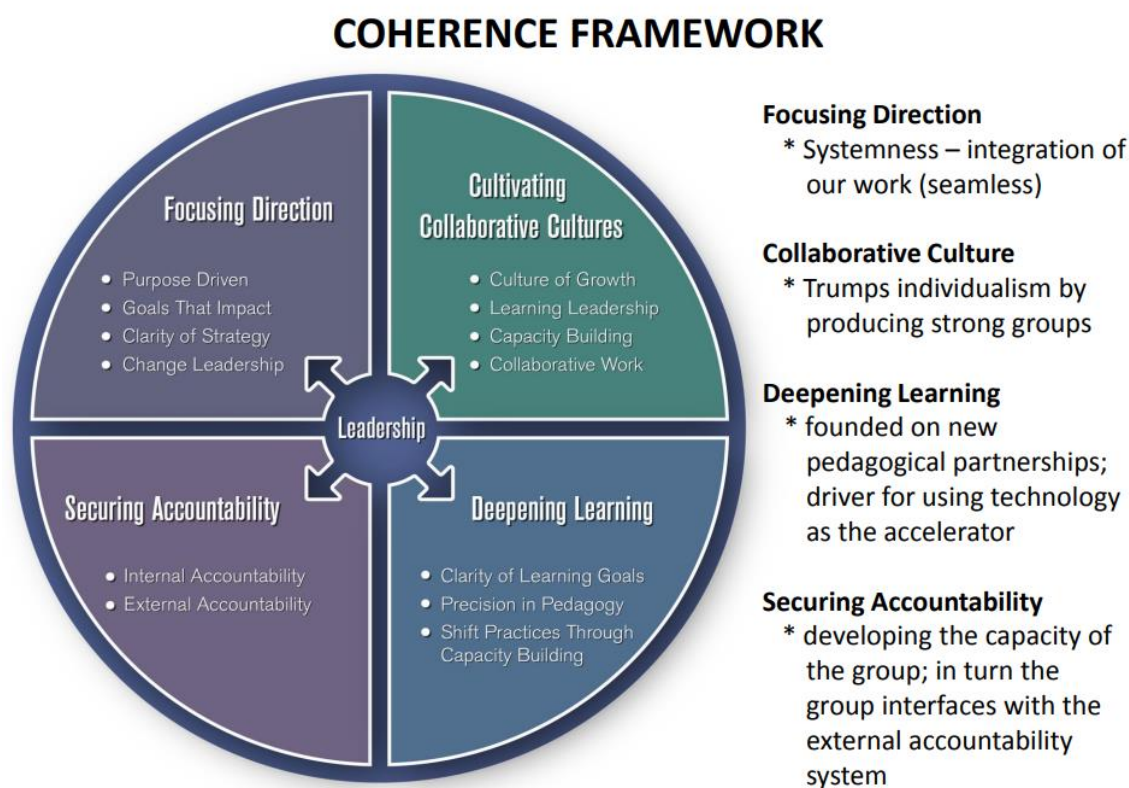
Note. From *Leading change* by J. P. Kotter, 2012. Harvard Business Press. Copyright 2012 by Harvard Business Press.

Another figure in change management is Fullan (2011), who names various change management processes, but essentially focuses on the messy middle. Leading change begins with a leader's strong moral purpose and relationship building. According to Innovation USD's board notes, the new superintendent was celebrated for his relationship-building skills, and the board believed he would guide the district into the future. Fullan (2016) noted the difference between bad drivers (punitive actions and good drivers (capacity building and a collaborative atmosphere in change management as ways to build stronger relationships within the organization). He defined coherence as "the shared depth of understanding about the nature of work" (Fullan et al., 2016, p. 6). Figure 4 is the coherence framework model describing how an organization needs a

sense of purpose, driving capacity, a collaborative learning culture, and accountability between groups.

Figure 4

Coherence Framework



Note. From “Coherence Making” by M. Fullan and J. Quinn, 2016, *School Administrator*, 73(6), p. 10.

Transfer of Shared Vision

Research on how shared vision transfers within organizations is still a growing field (Christensen et al., 2018; Kantabutra, 2008, 2010; Kantabutra and Avery, 2006; Liou & Daly, 2019). Vision research points to Senge's (1990) description of vision as being negative or positive, and, as of 2010, "only a handful of exceptional studies have investigated vision characteristics" (Kantabutra, 2010, p. 321). Kantabutra and Avery (2006) defined shared vision as "a mental model that a leader defines, given that it is the actual mental model that guides the leader's actions and choices." After an extensive literature review, the most effective shared visions had the following characteristics: Brevity, clarity, future orientation, stability, challenge, abstractness, and the ability to inspire. (Kantabutra, 2008). In a study on the transfer of vision to followers, Kantabutra and Avery (2006) found that vision will always guide the leader's behavior, and vision guiding depends on whether followers will accept and help execute the vision, employees have an emotional commitment to the vision, and whether employee satisfaction is aligned to customer satisfaction. Liou and Daly (2019), in a longitudinal study in a large urban school district on vision, found that district and site leaders should experiment and co-create new approaches and innovations, share knowledge, and exchange resources during structured time to strengthen the communication pipeline between central office and site leaders.

Shared Vision for 21st Century Organizations

Various studies also focused on shared vision in districts that wanted to implement technology initiatives (Adnan & Valliappan, 2018; Agélli Genlott et al., 2019; Casey, 2005; Christensen et al., 2018; Friedman & Berkovich, 2020; Gonzales, 2020). The research considers technology implementation a second-order change, defining it as "innovation driven, irreversible and requiring fundamental change from current practice" (Agélli Genlott et al., 2019, p. 3023).

Correlating with Hattie's (2012) meta-analysis regarding the zero effect of technology on student achievement, Agélli Genlott et al. (2019) found that "ICT use without integration with a pedagogical method can yield worst results than not using ICT at all" (p. 3022). The call for focusing on teacher pedagogy through professional learning communities, social systems for learning, and teachers participating as actors in the change initiatives has positive effects on success. Hubers (2020) also offered insight into leading teachers in second-order change initiatives by creating a recommended sustainable model toward change. Table 10 shows the characteristics of sustainable second-order change in school systems.

Table 10*Characteristics of Sustainable Second-Order Educational Change*

Characteristic	Recommended initial methodological considerations
1. Substantial changes that are made that affect the core of educators' everyday practice.	Determine why and how the educational change affects the core of educators' everyday practice (e.g., through using its theoretical underpinnings, collecting data about educators' perception).
2. A longitudinal process that starts as early as when educators contemplate whether or not changes need to be made. It ends when satisfactory achievement on the other three characteristics is reached and overt learning efforts are stopped.	Gain a process view of how change develops over time. If possible, collect data at multiple time points and try to be involved from the beginning to the end of the change process.
3. A process of individual learning (professional development) and organizational learning as well as of changing behaviors at both the individual and organizational levels.	Gain insights into learning processes at the individual and organizational levels (. If possible, consider how these learning processes relate to each other. Determine what changes were made at the individual and organizational level (e.g., through students' perceptions, observations, and studying the development of organizational routines).
4. A change process that results in improved student outcomes.	Determine what needs to be measured via educators' engagement's effect on student outcomes. Determine how student outcomes should be measured through multiple measurement methods. Determine how characteristic 3 and 4 influence each other through t the change process. Determine steps to understand why the change occurred and under what conditions.

Note. From “Paving the way for sustainable educational change: Reconceptualizing what it means to make educational changes that last,” by M. D. Hubers, 2020, *Teaching and Teacher Education*, 93. Article 103083. (<https://doi.org/10.1016/j.tate.2020.103083>)

Conceptual Framework

To frame my worldview as a researcher in this study, I refer to a sentence in Sinclair's (1998) article, which is a call for technology historians and future engineers of technology to consider how technology is imagined, produced, and employed in communities of color and then examine how the technological change impacts those communities. According to much research, technology has been designed to further oppress historically marginalized communities through biased AI technologies like algorithms that misidentify those with darker skin tones 50% of the time, algorithms at airports that misidentify non-conforming gender identities, or algorithms in advertisements that lead to placing loan shark companies in communities of certain demographics and wealth advertisements in already wealthy areas (Constanza-Chock, 2018; Ugwuodike, 2020). Although technology companies continually absolve themselves of creating racial divides, they fail to acknowledge the implicit biases embedded in computing through *master disk/slave disk* language embedded into programming language, hierarchal command lines, simulations of Black faces and bodies on servant robots, and the interface having users identify their race so algorithms can code marketing materials to them. Technology, along with the internet, "remains racially 'unmarked' as not racialized and therefore universal" (Atanasoski & Vora, 2019; Daniels, 2015).

Research also has turned toward access to the industry itself. It examines how technology is marketed to have White consumers placed as innovators while racialized consumers are placed as consumers. It also looks at how technology companies create sweatshops through outsourced labor from people living in the global south while "tech firms in Silicon Valley are predominantly led by White men and a few White women" (Daniels, 2015, p. 1379). Other research examines then how Bill Gates positions himself as the savior of immigration, helping to

expand HB1 visas to more-qualified foreign workers because Americans are supposedly not qualified enough to fill high-tech jobs, which Anyon (2014) called out as a false narrative that connects to the narrowing of entry-level jobs due to automation. These are the new narratives used to create tension and separation in the workforce.

Research has revealed that these narratives are false but used to justify why historically marginalized communities have always been and will always be left behind. The industrialized school model, aligned with the Second Industrial Revolution via obsolete standards and pedagogical practices and eugenic testing practices, also created false narratives telling all students that they have deficits. The other enclosure is the colonized teacher mindset fueled by deficit narratives about how marginalized students are not capable of rigor, making them complicit actors in the status quo.

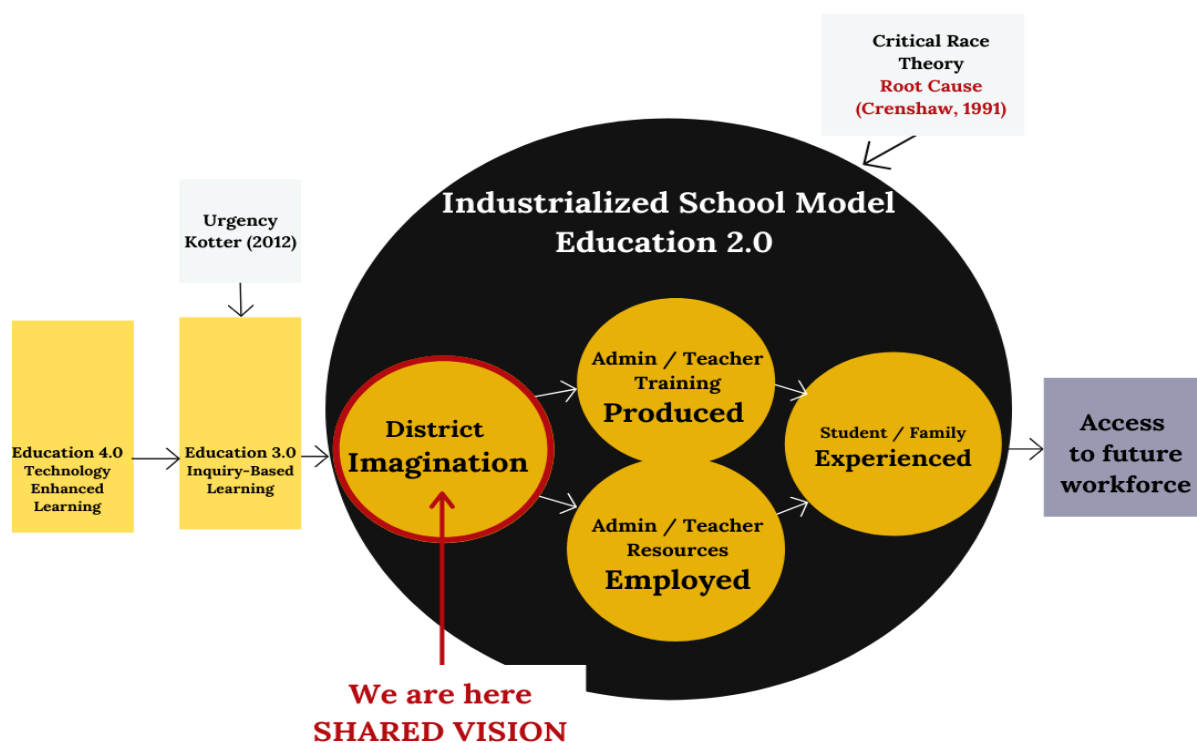
A fourth industrial superintendent who walks into a factorized school district must change both policies and mindsets. The urgency is that the education system overall has not caught up to the digital age and must first correct the instructional practices to allow for technology enhancements. This study focuses solely on the imagination piece of this framework, for it is the urgent need to change, but a leader must first imagine through creating a strong vision, producing human capacity, and gaining resources to employ the vision and evaluate the impact on end-users. In this case study, the new technology is IBL practices and how the superintendent at Innovation USD imagined his shared vision, planned for production of teacher knowledge and training, planned for resourcing the new process, and how he sought to understand how marginalized communities of color experienced the new practices of learning.

Figure 5 shows the conceptual framework that anchored this study of Innovation USD. The framework shows a larger black circle representing the current state of U.S. education. The

current state is an industrialized school model, Education 2.0, educators' deficit mindset toward minoritized students, and the governmental monetary ties to accountability based on eugenic testing measures. The four circles in the middle represent Sinclair's (1998) construct of technology as it impacts marginalized communities. In the context of a school district, a superintendent must use imagination to plan for drastic teaching change by producing human capacity through training staff on the new teaching technology of IBL, gathering and employing resources to fund the new teaching initiative, and finding ways to evaluate student and family experiences. The rectangles to the right represent new teaching technologies, Education 3.0, which are inquiry-based teaching strategies that must urgently move through Sinclair's model as well as the next teaching technology, Education 4.0: teaching strategies enhanced by technology advancement. Lastly, the gray square to the left of the circle is an output area representing a successful entry for students to access the new job opportunities within an Industry 4.0 workforce. This study focused on the plans of one superintendent who is currently making this change at his school district toward addressing the inequities in the factorized school model and how he is currently moving through his change process by reviewing his process through this conceptual framework.

Figure 5

Conceptual Framework: Construct of Technology As It Impacts Marginalized Communities



Note. From “Teaching about technology and African American history,” by B. Sinclair, 1998, *OAH Magazine of History*, 12(2), 14–17. (<https://doi.org/10.1093/maghis/12.2.14>)

Chapter Three: Methodology

Critical race theory (CRT) reveals several root issues from the past that affect superintendents' ability to navigate their districts into true 21st-century learning models of IBL and technology. Beginning with the factorization of the school system during the Second Industrial Revolution, which tried to match content and skills taught in the schools with the content and skills needed to succeed at the turn of the 20th century (Darling-Hammond, 2015; Darling-Hammond et al., 2014; Dintersmith, 2018). The continued negative impact of school reform policies has left superintendents accountable to government control over standardization approaches, leading to only 40% of students being proficient (Milner & Lomotey, 2014; Moses & Nanna, 2007, National Assessment of Educational Progress, 2019). Unfortunately, the job market has moved into a more digital environment led by critical thinking and creative skills processes and is now misaligned with school systems' standardized way of teaching (Maynard, 2015; Wagner, 2008).

Research points to constructivist ways of learning, amplified by technology as a way forward for pedagogical models, yet the production of deeper critical thinking methods is not truly detectable through government-mandated standardized testing methods fueled by the testing industry. Meanwhile, global school systems are taking advantage of IBL and technology by specifically preparing citizens for the current and future job markets using more efficient, agile school models, such as Education 4.0 in Malaysia (Adnan & Valliappan, 2018). To give students access to future job potential, a superintendent needs to articulate their vision for the future and change 21st-century mindsets toward future models of learning styles to make the second-order changes needed for student growth.

The literature for this case study reveals the systemic layers of racism and social constructions that revolve around the extraction and then the separation of science, technology, and constructivist pedagogical ways that are more conducive for this next industrial revolution as it pertains to historically marginalized communities of children. The literature lacks a system to specifically address the change management of a K–12 school district that engages in an equitable systems change toward the future industrial revolution 4.0. Literature also reveals a series of interviews with savvy superintendents as they discuss technological changes in their systems, but the interviews did not discuss how their second-order changes impacted end-users from historically marginalized communities. Thus, how the Innovation USD superintendent makes such changes from pedagogy to transformation of school buildings as part of equity goals is a case that should be studied further to help other practitioners in the field navigate their school districts to break through the factorization of schooling toward future models of what schools should be.

Purpose of Study

The purpose of this case study was to examine a superintendent in the process of transforming a school system toward equipping students with the content and skills needed for the future workforce. Through the lens of shared vision, I gained a better understanding of the successes and challenges the superintendent and district faced and how they affected the change management process. The study of how shared vision is imagined and transferred throughout the district may help other superintendents be more equipped to make second-order changes in their districts to better prepare students for the future job market. Two research questions guided this study:

1. How did this superintendent imagine, plan, and spread his vision for the future to other leaders within the district?
2. How did those leaders experience the vision, imagine the vision through planning, and transfer the vision throughout the district?

Selection of Population

I interviewed the superintendent, the assistant superintendent of educational services, the chief operations officer, the director of instruction and innovation, and the director of ethnic studies at Innovation USD. I selected the participants due to their levels in the district and their roles in moving the superintendent's vision of IBL practices forward throughout the district. The study focused primarily on how the vision was planned and transferred throughout the district. Using the imagination portion of Sinclair's (2002) framework of technology's impact on marginalized communities allowed me to understand the plans made at the highest levels of the school system to examine the imagined impact on historically disenfranchised communities. I compared the plans with the reality of asking for feedback from communities of color. This allowed me to understand the successes and challenges to inform further research.

I used purposeful sampling to examine how other district leaders experienced the superintendent's shared vision. Three factors make Innovation USD unique to align with Merriam and Tisdell's (2016) unique sampling preference. First is the specific call from the parents in 2015 for an equity review of the school district and the recommendation for a new equity plan. Second is the change in district superintendent in 2016 and the charge toward future inquiry-based pedagogy that was infused in the new equity plan. Lastly, in lieu of moving the district toward the future of learning, there was an immediate expansion of a constructivist pedagogical model, a reconstruction of school learning spaces, and the building of staff

capacity/resource distributions that carried forth to create rapid second-order changes within 3 years. Understanding how the shared vision was imagined and carried out by the various followers will also help understand how major second-order changes are carried out by strengthening distributive leadership protocols. This district was chosen because it caters to a diverse student population. The schools in Table 11 are a partial listing of Innovation USD schools showing over 50% diversity. Lastly, this school district was chosen due to the many building renovations occurring in the school district.

Table 11

Innovation USD Student Demographics

School name	Demographic data	Quantity
Grand Elementary	Black	63
	Hispanic	170
	Asian	44
	White	267
	American Indian/Alaska Native	0
	Two or more races	29
J.W. North Elementary	Black	54
	Hispanic	97
	Asian	5
	White	112
	American Indian/Alaska Native	1
	Native	7
	Two or more races	
McKenzie Elementary	Black	45
	Hispanic	156
	Asian	49
	White	199
	American Indian/Alaska Native	1
	Native	1
	Native Hawaiian/Pacific Islander	
	Two or more races	24
John Wayne Middle School	Black	73
	Hispanic	503

School name	Demographic data	Quantity
	Asian	32
	White	307
	American Indian/Alaska	0
	Native	3
	Native Hawaiian/Pacific	88
	Islander	
	Two or more races	
Hewlett Elementary	Black	41
	Hispanic	211
	Asian	29
	White	189
	American Indian/Alaska	2
	Native	1
	Native Hawaiian/Pacific	18
	Islander	
Innovation High School	Two or more races	
	Black	202
	Hispanic	995
	Asian	188
	White	1,145
	American Indian/Alaska	2
	Native	7
	Native Hawaiian/Pacific	277
	Islander	
	Two or more races	

Design Summary

This is a qualitative case study, so I interviewed and observed participants in their natural environment (Maxwell, 2013). I adopted steps on conducting research from Creswell (2016) and Merriam and Tisdell (2016). The study focused on the research problem and purpose of the study presented in Chapter One. The literature review analyzes and defines the problem more clearly and frames the need of this case study and its impact on actionable results. Chapter Three addresses how the data would be collected, and Chapters Four and Five discuss data analysis, interpretation, and reporting.

Methodology

This study used a semi-structured qualitative protocol rooted in constructivist theory called appreciative inquiry. Appreciative inquiry interviews sessions are grounded in positive theory and allow participants to value the progress made while renewing participant rigor toward constructing their next step in the change process (Ludema et al., 2006; Stratton-Berkessel, 2010; van der Haar & Hosking, 2004). For the individual interviews, an appreciative inquiry approach protocol helped me delve deeper into the imagination portion of the shared vision (Ludema et al., 2006). According to Stratton-Berkessel (2010), appreciative inquiry models are usually used with organizational focus groups to co-create improvements in the organization. Using appreciative inquiry with the parent focus groups allowed me to gain deep access to what was going well while helping guide the parent groups towards evaluating their next steps in this change process. By staying away from deficit language models, I was able to understand the challenges of the district change process while helping participants participate in the construction of the part they will play to continuously improve.

Qualitative Instrument

The qualitative data were gathered using semi-structured interviews (Merriam & Tisdell, 2016) to ensure fluidity and expression of ideas. The alignment of interview questions to the research questions was imperative to the study, so I created an interview matrix (Appendix A). Open-ended, semi-structured interviews were conducted, and interview notes were taken during the process (Creswell, 2016).

Data Collection

Creswell's (2016) data collection steps were followed in this study: (a) locate the individual/site, (b) follow steps to gain access and create a relationship, (c) purposefully sample,

(d) collect data, (e) record information, (f) resolve field issues, (g) and store the data (p. 146).

The collection of documents was also critical for this case study. An initial collection of artifacts found on the internet was key to understanding some of the historical inputs that led to the systems change process Innovation USD is experiencing. A collection of news articles, testing data, district goals, individual school goals, the initial documents surrounding the equity audit with conclusions, the new districts equity plans in reaction to the equity audit, school board meeting documents, and electronic district email communication documents were all included at the beginning stages of this study and were continually updated throughout this study.

I contacted participants based on their leadership position in the school district. Thus, I interviewed the superintendent, assistant superintendent of educational services, chief operations officer, director of instruction and innovation, and director of ethnic studies for this research. I used purposeful and unique sampling in selecting participants due to the specific roles they played in the acceptance, planning, production, and employment of the district's vision. I selected them due to the work they did to advance the superintendent's shared vision throughout the district. The district is not only changing the teaching methods but also designing buildings and facilities to revolve around the new teaching methods; thus, the department of operations was invited to participate in the interviews.

All participants' schedules were coordinated at least a month before the interview. I used emails and phone calls to verify and confirm participants scheduling requirements (Creswell, 2016). Although I was fully vaccinated and COVID-19 measures were lifted for a time, interviews were conducted both in person and via Zoom video conferencing software. Videos conducted by Zoom limited the number of additional observation techniques throughout the interviews. I followed the Innovation USD superintendent for a day and examined presentations

from the district. I used appreciative inquiry protocols throughout the interviews (Ludema et al., 2006; Stratton-Berkessel, 2010; van der Haar & Hosking, 2004) and asked participants about their comfort levels in being recorded throughout the interview (Creswell, 2016; Merriam & Tisdell, 2016). At the beginning of each interview, I gave participants information regarding the purpose of the study and asked for their consent to conduct the interview (Merriam & Tisdell, 2016). I also emailed each participant a copy of the introduction letter prior to the interview. I made follow-up phone calls to clarify pertinent information to target the research questions. I transcribed and reviewed all of the interviews.

The continual data collection of public records, personal artifacts, newspaper articles, district emails and information, social media pages, and visual artifacts generated from researcher observations were also collected throughout the study (Creswell, 2016; Merriam & Tisdell, 2016). I also kept a research journal used throughout the study as a data collection apparatus (Creswell, 2016). Various data sources gave more contextual evidence from the interview data and helped triangulate the themes presented in Chapter Four.

Data Analysis

I used a qualitative appreciative inquiry approach to collect data in this study. All items in the survey and interview protocols aligned with the research questions. To understand the impact of Innovation USD's organizational change on families, with a focus on shared vision, I used an inductive analysis approach to studying the data (Creswell, 2016; Merriam & Tisdell, 2016). I followed the steps of coding as outlined by Gibbs (2018): (a) data preparation, (b) writing, (c) thematic coding and categorizing, and (d) analyzing biographical, narrative, and discursive elements.

As interviews were being recorded, electronic transcriptions were made of all recordings, which I reviewed and added notes on setting, context, and body language (Gibbs, 2018). Adding the notes, photographs, observations, and other documentation to the transcripts allowed for better interpretation measures when looking for larger themes. NVivo software helped me further analyze all data and place them into emergent codes (Creswell, 2016). I later converted the codes into major themes presented in Chapter Four. I also uploaded all review documents and artifacts into the system to help triangulate and verify themes created.

Validity and Reliability

Throughout the study, I created systems of validity and reliability in several ways. First, I critically reflected on bias throughout the process. Wertz et al. (2011) specifically discussed a more holistic approach to analyzing narrative qualitative interviews by reading between the lines when speaking with participants. I maintained the balance of reading between the lines as it related to my personal bias by aligning all collected data to my conceptual framework. This allowed me to stay focused on the quality of information obtained. Purposeful sampling was used to interview the superintendent, who is Black, and other leaders at the district and school sites who reflect a diverse workforce. I sought to infuse a CRT perspective throughout the process; therefore, I specifically asked probing questions about the leaders' positionality. The intent was also to gain a better understanding of how their ethnicities played into the dissemination of shared vision throughout the district.

According to Merriam and Tisdell (2016), a researcher brings a certain level of bias into the study through the presentation of their conceptual framework and accompanying lenses that offer the study's consumer a window into the researcher's worldview. I presented a conceptual framework that outlines my worldview perspective using a CRT lens in the literature review. I

constantly reflected on additional biases that dealt with my ethnicity, positionality, and social status in data analysis to ensure that biases “beyond the epistemological or theoretical framework” (Merriam & Tisdell, 2016, p. 208) would not project onto the data. Thus, the population sampling, the selection of the constructivist model of questioning following appreciative inquiry protocols, data collecting, and analysis of all data aligned with the research questions and my worldview by applying a conceptual framework through a CRT lens. Positioning myself and my worldview throughout the study added to the reflexivity giving the study more authenticity and credibility (Creswell, 2016).

Throughout the selection, data collection, and data analysis, I continually used critical reflection on the process to ensure the highest levels of ethical standards to ensure the validity and reliability of the information. Due to qualitative study being a co-construction of how others view the world (Creswell, 2016; Merriam & Tisdell, 2016), I ensured validity and reliability in the interviewing by using appreciative inquiry protocols. By design, appreciative inquiry “produces a range of hopeful vocabularies offered as an epistemological alternative that supports positive relational reconstruction (of social relationships)” (Ludema et al., 1997, p. 1018). Thus, question design infused humanity into this study to build hope language and add to the authenticity of this study. The emphasis on the ethical and secure handling of data, asking for consent prior to interview sessions, creating a space for adequate timing of collecting data, and analyzing the data all added to the credibility of this research (Merriam & Tisdell, 2016).

Summary

This case study on a single school district used a qualitative appreciative inquiry approach. Data were examined from public and private artifacts, and interviews were conducted with the superintendent, district-level leaders, and school site leaders to target the research

questions. These findings have been presented in Chapter Four, with a discussion of the findings in Chapter Five.

Chapter Four: Findings

This chapter presents an analysis of the data regarding the strategies used by a fourth industrial superintendent who imagined and transferred his vision toward equitable IBL practices in a public school system. As the global education system is moving toward IBL practices by preparing citizens for the next industrial revolution, research has unveiled several antiquated practices that are thoroughly embedded in the U.S. education system, aligning current graduate output of skills with the second industrial revolution workforce (Darling-Hammond et al., 2014; Dintersmith, 2018; Dintersmith & Wagner, 2016; Mehta & Fine, 2019). Many institutional barriers contribute to the lack of vision to shift from a factorized model of learning toward IBL pedagogies that include collaboration, communication, creativity, critical thinking, and cultural intelligence, all rooted in real-world issues (Dintersmith & Wagner, 2016; World Economic Forum, 2020). The system of accountability through standardized testing, exacerbated by the negative impact of school reforms, has forced district leadership and teachers to align student instructional time around content that will only be on state testing (Au, 2007, 2014). Research points to how the proper implementation of IBL pedagogy amplified by technology will accelerate learning possibilities and allow students to gain access to the fourth industrial workforce, specifically for students from historically marginalized communities of color (Acosta et al., 2020; Jang, 2016; Van Laar, 2017, 2020).

Findings from initial research on Innovation USD revolved around the equity report given to the district in 2016. The report found that despite a strong track record on test scores, the school district had a long history of academic achievement disparities as it pertained to students from historically marginalized communities. Findings from the equity report also highlighted a lack of consistent implementation of systems, structures, and processes aimed at eliminating

academic disparities due to varied expectations in the classroom, siloed school sites contributing to divergent approaches when implementing key initiatives, resistance among staff toward district-led initiatives, and a lack of coherence when advancing equity within the schools.

A new superintendent was appointed in 2016 with a new vision toward equity which targeted the pedagogical practices of the district's teachers. This is a qualitative case study focusing on the transfer of vision from the new superintendent to his district leadership. Qualitative data were collected via individual interviews with the superintendent and four district leaders. Qualitative interviews were conducted in a semi-structured approach using a constructivist interview protocol of appreciative inquiry (Ludema et al., 2006; Stratton-Berkessel, 2010) as a reflective tool to deconstruct each participant's journey from planning stages, implementation, status, and dream of future possibilities. Questions aligned to the framework applying Sinclair's (1998) view on technology as it impacts historically marginalized communities: imagination, produce, employ, and user experience. This study culminates in a potential framework to help other district leaders implement new IBL pedagogy at their schools so that all students have access to the future workforce.

Participants

Participants of this study included the current superintendent, the assistant superintendent of curriculum and instruction, the chief operations officer, the director of instruction and innovation, and the director of ethnic studies. Table 12 highlights the participants and their roles in the school district.

Table 12*Interview Participants*

Job title	Demographics	Role
Superintendent	African American male	The superintendent, in conjunction with the board of education, sets the vision for the district.
Assistant superintendent of educational services	Latin American female	To support the vision by transforming instruction practices in the district to IBL
Chief operations officer	White male	To support the vision by transforming building structures toward inquiry-based instruction
Director of instruction and innovation	Black American male	To support the vision by coaching instructors in PBL principles
Director of ethnic studies	Indian American female	To support the vision by decolonizing the history curriculum

The research results presented are organized by research questions. The research questions guiding this study and serving to organize this chapter are

1. How does this superintendent imagine, plan, and spread his vision for the future to other leaders within the district?
2. How did those leaders experience the vision, imagine the vision through planning, and transfer the vision throughout the district?

Purpose of Study

The purpose of this study was to understand how a superintendent creates, transfers, and spreads shared vision throughout a district to create second-order changes. By using Sinclair's (2011) analysis of how technology impacts Black people through imagination, production, and

employment of a new way to teach students using PBL, this study centers around the transfer of shared vision in one district. This study will allow for the beginning of a framework to help other leaders support all learners for the next industrial revolution. The research question focuses on two areas of inquiry: the innovation and dissemination of shared vision from the superintendent to district leaders and the reception of that vision and co-creation of that vision from the district leaders to the school sites and community.

Coding of Data

Data analysis centered around an inductive coding approach bringing a holistic value to the lived experiences of all participants (Wertz et al., 2011). From the superintendent's interview, supported by subsequent participant interviews and artifacts to triangulate the data, arose three findings for each research question and, subsequently, five overarching ancillary findings, helping to guide a framework toward equitable IBL practices at Innovation USD. I followed Creswell's (2016) and Wertz et al.'s (2011) approach to constructing and deconstructing the narrative data collected: (a) Collecting data, (b) managing data, (c) reading and memoing, (d) describing, classifying, and interpreting data, and (e) representing and visualizing data. I filtered narrative themes through the conceptual framework, adding to the reflexivity and transparency of the applied worldview (Wertz et al., 2011).

Findings

I present findings placed into categories and themes aligned to the research questions. The data analysis will help support future superintendents motivated to shift school system pedagogy toward IBL opportunities for all students to gain access to the next industrial revolution workforce.

Results Research Question 1

Research Question 1 asked the following: How does this superintendent imagine, plan, and spread his vision for the future to other leaders within the district? A qualitative interview with the Innovation USD superintendent, along with correlating artifacts, produced three findings: (a) moral purpose moves toward a theory of action, (b) creating an intentional IBL project, and (c) a dynamic of learning through reflection. Figure 6 synthesizes the findings from Research Question 1 to illustrate the dynamics of how each finding builds upon the next.

Figure 6

Research Question 1 Findings



Moral Purpose to Theory of Action

The first finding revolved around having a strong moral purpose leading to a theory of action. The story of the vision for this district begins with the superintendent's personal narrative that manifests in his moral purpose (Fullan, 2011). His lived experiences came with layers of social constructs: immigration, socioeconomics, linguistic challenges, and being Black in American society. These intersectionalities give him an interesting perspective on equity and educating children in America. When discussing his native country, the superintendent stated,

You have possible newspapers here and there, but it's not a lot when you have a lot of people that didn't go to school. Democracy is delicate. If you don't deal with the people, you're going to have people raise arms, people can't eat, and they won't have a place to sleep. If we don't educate everybody, we are going to have problems. That's why to me, education is so important. Like Fullan says, transforming education is the most important thing we can do right now.

He continued with a statement he attributed to Michael Fullan: "Transforming education is the most important thing we can do right now."

Table 13 is a series of statements made by the superintendent that gave value to the various intersectionalities he had growing up in the U.S. educational system. These intersectionalities imbue the work he does as an administrator and ignite his passion for equity in the education system.

Table 13*Observed Lived Experiences That Impact Superintendent's Moral Purpose*

Lived experience	Layered intersectionalities
I was born in Uganda and came here as a refugee of war back in 1979.	Immigrant/refugee
There were 10 of us kids in the family, poor, we didn't have anything.	Socio-economics
We didn't even speak English!	Language
I also recognized there are some things about American culture that I was able to kind of see because of that, because I came from the outside. I said, "This is a complicated country," and racism is complicated, and we need to address it.	Black

When interviewing for Innovation USD superintendent, he specifically developed a theory of action plan that targets historically marginalized students. Due to the school board wanting to find a superintendent who would address their equity audit, the superintendent created an action plan that involved the advancement of all students, stating,

I think I have to be cognizant that I'm a Black superintendent. Although my focus is on making sure that we deal with the achievement gap, I've got to make this thing real for everyone. You helping Blacks is for everyone. You helping Latinos is for everyone. You helping socioeconomically disadvantaged students is for everyone. That's why I don't go into the achievement gap. I discuss the bigger picture.

The bigger picture is real-time global discussions that affect students in their everyday lives. It involves types of issues that engage students and demand their attention and discussions around how students can work toward solving these global issues at the local level through IBL practices.

Life experience also shaped the superintendent's passion for IBL for all children. As a principal, he was introduced to The Center for Advanced Research and Technology program, which specifically designed IBL experiences for students using "career-specific laboratories in which students complete industry-based projects" (Center for Advanced Research and Technology, 2022, para 1). During laboratory sessions, the superintendent noticed that students were completely engaged in learning. Table 14 presents quotes demonstrating the CART program's impact on his moral purpose as it pertains to equity and IBL. The table is organized to illuminate specific quotes that correlate to his observations of IBL and how he viewed IBL pedagogy could affect change among various student populations.

Table 14*Observed Lived Experiences From Efficient IBL Used With Students of Various Demographics*

Engagement verbatim	Student demographic
You come from a traditional school; some people come in with a special education aid. So, when you come to CART, doing a visitation, you'll see some adults sitting around not really doing anything. You're thinking, "Well, what are they doing?" They came with their special education students and had nothing to do.	Special education students
Everybody's engaged! The teacher is engaged in assisting, arguments are happening (between students), and it's just fascinating!	General students
When students are working in multicultural groups, and you have Black students on the team, they're going to bring a perspective to the team that you, as a White person, never considered.	African American students
It's kind of like your dissertation, right? How excited are you? You're invested because you have a question, and now, you're ready to go. It's the same thing over here.	General students

Research indicates that organizational change management begins with a leader's moral purpose for change (Fullan, 2011; Kotter, 2012). It also indicates that a moral purpose allows a leader to create urgency towards change. The superintendent's observations from the CART programs, along with his lived experiences, resonate with the larger vision for what school should be. By having a tangible example of how those programs specifically engage traditionally marginalized students of color, he used this model of teaching to guide his planning which led to his theory of action plan for Innovation USD, stating,

You must name it [in policies]. When meshed together, I don't need to be specific, but if I name Latinos and African Americans, then you've got to ask the question. Okay, what

do you need? Well, first and foremost, you got to teach real history, make learning relevant, and approach learning in a culturally responsive way through [PBL]. When it's not named, and everything is meshed together, then you don't have a specific game plan, right? No, it's because you don't want to name it for what it is.

Another concept that arose was the concept of firing, hiring, and promoting various people who either do not share or do not wholeheartedly share the leader's vision. The autonomy to appoint and hire his cabinet/leadership teams fortifies the foundation of establishing collaborative cultures and strong relationships. For the first couple of appointments, the superintendent did not use a hiring panel but appointed his assistant superintendent of instruction:

The key is the board. I have to make sure they understand what I need. There was a director that really wanted her job, and I directly went to her and said, "Look, there's some things I need. I need to appoint. I'm not going through an interview. But this is my second year, I got to have somebody understand what I need done. While I'm working with the community, I need somebody to run this thing." You just gotta be honest with people. I'm not going to take them through a process, and I know how organizations work. People don't want to change. If I take people through a normal interview panel, she would have gotten selected because these folks don't know what I need. Their voting with their friend or what's comfortable.

The first reason for this action was to show the district the type of person he needed to serve alongside him as he made second-order change. The second reason was the candidate's strong work in equity and specific knowledge in building bridges between the school district and

historically marginalized communities. The cabinet he surrounded himself with was culturally diverse and filled with people from various fields and industries.

Creating an Intentional District-Wide IBL Project

The second finding was what the superintendent referenced as “setting up conditions.” Within the theory of action plan, he created a framework that intentionally set up the conditions for teachers to lead initiatives from the middle, leading to school sites creating their own theories of action and resulting in a cohesive district-to-school site model producing collective psychological ownership (Martinaityte et al., 2020). To evaluate the superintendent’s plan for the district, we must take a step back to the context in which he was hired. The district’s equity report was produced in 2016. During the interview, the superintendent walked through the components of his moral purpose, which led to his theory of action plan. In 2016, the district faced a local news report that specifically focused on the discontent of Black and Latinx parents regarding the type of education their children received.

By the summer of 2016, the district received an equity report from an outside consulting firm that analyzed previous district and school equity initiatives and the mechanisms used to initiate and support the change process. The firm interviewed various stakeholders about their perceptions of past equity efforts in the past. The report revealed a lack of buy-in to district initiatives due to top-down approaches that created a culture of opposition, a lack of a cohesive desire to advance equity initiatives from leaders, siloed schools with divergent approaches to implementing key initiatives, and a lack of building capacity to support equitable learning and academic practices.

The current superintendent presented the board with his theory of action plan, which was implemented. The superintendent specifically aligned his theory of action plan with the equity

report. He spoke to his moral purpose, values, the vision, and theory of action or steps he would take to implement the vision he presented. Talking again at a high level about why IBL practices were so important, he discussed the possibilities for the district to prepare all students for life outside of school.

Shared Leadership Through Accountability

The superintendent created his plan with the concept of teachers leading from the middle, aligned with the district's plan for achievement. The district sets forth the vision, supports the vision through educating all stakeholders, and then helps schools by resourcing teacher-led, school-led initiatives. Figuratively, the concept of leading from the middle places the teachers at the center of a diagram. The teachers are then guided by the principals as lead learners, supported by coaches and district leaders. At each school, a teacher leader is chosen from each department to help initiate conversations around plans of change related to district-aligned policies centered on pedagogical practices. Leaders and teachers work in tandem to develop their school-site IBL protocols, educate the community on their new pedagogy style, and place all innovations in the school-site plan, which is aligned with the local control and accountability plan (LCAP).

The district set the goals and non-negotiables, which were pre-negotiated with the teacher's union. The teacher's union is continually included in discussions about the district's vision of equity through the shift to IBL. Weekly check-ins and quarterly accountability reports are essential to the questioning process as teacher leaders, principals, and district leaders present the board with quarterly results from student projects and learning outcomes. Table 15 details how the district is organized to create collaborative cohesion between the schools and the district. The table also outlines the accountability check-ins conducted weekly and quarterly.

Table 15*Creating a High Performing Co-collaborating School Community*

Steps to success	Implementation	Verbatim
Professional learning communities at all levels	Teacher PLC groups	The first thing I did was work with the union. I said I'm not here to tell you how to teach. I'm here to elevate us to work together. I want to give you voice in decision making.
		Leading from the middle means that I'm not telling them to do that, I'm creating the environment where I showed them the inequities in our schedule.
		We engage in student talks to help us understand their point of view better.
	Teacher leadership clusters	I said that leadership teams in schools are key. If we're going to collaborate about massive issues, we're going to talk about it.
		I have 10,000 students and 2,000 staff. How do I get into a place where I can communicate with them? I can't be in an auditorium every day talking to everyone.
		There has to be a leader from their department. So, you have all these leaders that meet with the superintendent, and that is the school's leadership team.
		And this is a negotiated item. I pay the PLC leaders, and I pay the site leaders of teams. So, anytime we convene about a district-wide approach to something, then they meet with the site leadership team, and then they break up into the site.
	Principal cohorts	The principal is what we call a lead learner, meaning I'm not going to be here as the principal to tell you everything.
		You have a site leadership team with all my instructional leadership coaches, my

Steps to success	Implementation	Verbatim
		coordinators, my department research and assessment team meeting and supporting school sites. Then the district also has their leadership teams.
	District leadership teams	My entire ed services division is in one place with all my instructional coaches, my coordinators, my department of research and assessment. They are all questioning because we never want teachers to say, “Well, it’s because that’s what the district wanted.”
Alignment of school site plans with LCAP data	School autonomy	I’m a firm believer in that we support the schools, but I need the principals and teams to develop a plan to present to me that you understand the outcomes I’m looking for. You’re going to have different approaches. One principal I hired wanted to do IB [International Baccalaureate] and asked if I would support it. Yeah, of course, but you will need to sell that to your community. So, his plan is IB focused but with district goals in mind. A different school’s action plan deals with academic language within [PBL]. So, notice they look different, but the goal is the same. You give them (the schools) the opportunity to do that. You can never say that this is a top-down decision, right? How to do the work? All I ask for is the goals we need. That is non-negotiable. Then you are going to develop your plan for your site. You need to make it authentic.
Weekly and quarterly		We have teams that are engaged in weekly

Steps to success	Implementation	Verbatim
check-ins	and monthly check-ins. You can't just say, "We planned this at the beginning of the year, I'm not going to talk to you ever again," about archives. We've got to know if we are making progress. Which students are doing well or not doing well? Are they understanding what we intended? Really having deep conversations in the weekly check-ins. And then quarterly progress reports. This is where I'm bringing the board into play because a lot of times, what happens is if you don't do this, what we're trying to do is capture the issue at hand right now. If on our weekly check-ins and quarterly check-ins, we start seeing the divide between Latinos, and Blacks, and Whites right now. Why can't we pause? Why can't we figure out why this is happening? Why is it that those specific students aren't getting it? What is happening? From that process of reflection, we can go through the sites and see if it is an issue of engagement. You could talk to the kids. We notice this, what do you think about it? They might say that they are reading Shakespeare (not a standard, just a reading) and they are not fully engaged in the reading. Again, the most essential question to me is, why is this happening, and what does the research say? So, these check-ins are key because you need to establish a culture of accountability.	

A Learning Organization and Reflective Organization Dynamic

The third finding was a continual cycle of reflective practice centered around student voice. Several times throughout the interview, the superintendent discussed the importance of understanding student needs by speaking with them directly. The qualitative research began with student voice when district leaders conducted their equity check-ins and moved into collective research for better understanding, which eventually led to a quarterly review of the school plan for student achievement (SPSA). These actions helped to create immediate and continual growth for all stakeholders. Each SPSA plan holds each school site's theory of action, goals for students, and professional development plans to reach those targets.

Teaching Cross-Cultural and SEL Skills. Creating an equitable organization at Innovation USD meant inviting all stakeholders to discuss and create a shared understanding of what equity is and educating them about the true meaning of equity and equitable practices to change the culture in the district. To create this shared understanding, leaders held reading sessions to educate themselves on zero-sum philosophy to gain a better understanding of the institutional enclosures surrounding African American and Latinx students. According to the superintendent, “There’s a nuance to this thing; why mess with things when things are perfect?” Not wanting to affect the already achieving, highly affluent students was just as important to him as closing the opportunity gaps for students of color. Therefore, strategies were set for creating an inclusive atmosphere for students who have been locked out of the curriculum.

The capacity building around PBL and the notion of end products were introduced. Additional training and professional development sessions on IBL protocols were implemented using the shared accountability model. According to a local news article, the superintendent and a learning coalition of district stakeholders spent about a year studying various IBL models by

visiting schools that have successfully implemented IBL at their schools. According to board meeting documents, the district approved special training from leading organizations specializing in IBL implementation. The superintendent discussed how, throughout the district, leaders and staff studied Fullan and Quinn's book *Deeper Learning*. He also purchased the workbook to accompany the book and paid for Michael Fullan and staff to help train and assist staff on IBL understanding and implementation strategies. For principals who were resistant to the new style of learning and looking to continue status quo pedagogy at their schools, he took them on tours of various school programs that implemented IBL to attend to personal growth and to help develop the principals' and community's understanding about what teaching and learning should look like. Table 16 is an example of how to build a cohesive learning organization.

Table 16*Steps to Creating a Learning Organization Focused on Equitable Education*

Steps to success	Implementation	Verbatim
Book studies	Sum of Us (Author)	This book is a powerful book. I had the entire administration read it:70 and board members.”
	<i>Deeper Learning</i> Fullan and Quinn and workbook	He [Fullan] talks about actually in this book, too, in <i>Deep Learning</i> .
School investigation teams	Visited successful school sites that used IBL protocols for teaching all students.	It’s a warehouse of rooms with computer work taking place, machines fabricating materials, all culminating in a year-end project,
	Create opportunities for resistant leaders to tour facilities of the successful programs.	I got a principal who didn’t really want to do PBL. So, I took him to CART. We did all kinds of tours, and the parents were excited for the whole thing. All of this is happening, the bond is passed, and the principal is sitting there saying, ‘ I don’t know about this.’ Well, this can’t work because the principal is now going to fight with the community that does want this.
Professional development	District leaders and coaches	The school leadership team then breaks it up, and it goes back to the PLCs. So, you can have that conversation going back and forth.
	PLCs	Everything is structured into teams, from team leaders to teacher PLCs.
Centering student voice	Equity conversations	There was something called My Dear — High last year after George Floyd. A lot of high schools had students report issues of racism. Ours was one of them. Leaders and staff went around and actually talked with students about their experiences.

Steps to success	Implementation	Verbatim
	Student check-ins	After reading this and then engaging in student talks Any time I stop and ask students what's going on because I'm trying to help you. This came from students' living experiences. In a restorative way, what we found was when a student gets to explain their peace in a restorative way with the adult, often they say something that the adult never even possibly considered. So, you go back and ask the question. Hey, what are we doing? Do we need to go talk to students? Let's review what happened.

Through a continual learning organization focused on equity, the why behind IBL practice, and student engagement, district stakeholders began to mutually agree on what equity truly is and how pedagogical practices enhance learning for all students. The learning organization is the base to gain a shared understanding and language around equity in pedagogy to move the curriculum into the decolonization of Eurocentric views of learning.

Simultaneously, the superintendent had the board adopt anti-bias frameworks during his first month: "If you want me to create an ethnic studies curriculum, I need to understand first, what do you want out of that?" The board thought that an ethnic studies program would solve their achievement gap. He immediately created a shared agreement on how the curriculum needed to engage students differently to help include them and to give access to a Eurocentric curriculum through engagement. The problem was deciding whose culture has the most social capital in the school system to be studied and how to place these studies during the school day.

After evaluating various frameworks, the board approved infusing the history curriculum with a social justice framework, developing courses that include a minimum of five perspectives from various social constructs where students develop an interdisciplinary project that focuses on an equity issue.

Engage in Reflective Practices Around Issues of Equity. The last section of the superintendent's theory of action revolves around meaningful reflective practice to continually assess progress and make instructional changes. In many districts, schools create a yearly plan of action for the school board to approve and evaluate the following year after state test scores are recorded. The principals work with their community stakeholders to review data and set plans and goals aligned to the district's goals. The superintendent considers this process "red tape" for each school year for principals to throw haphazard plans together without constantly letting those plans guide the direction of each school site.

At Innovation USD, the district set forth goals along with embedded accountability. Four times each year, principals take a pause each quarter to reflect on each student segment and adjust their plans if needed. Principals sit with the superintendent to discuss their school achievements guided by their SPSA to show evidence of impact. The superintendent is currently searching a path director who will regularly discuss each principal's SPSA prior to their meeting with the superintendent to help coach them on their plan. The superintendent stated, "The reason why I bring those directors is, this is their number one task. To make sure that this is happening in an authentic way." He tied this authentic space of reflection to their evaluation process, stating, "I'm not saying to be perfect. I'm just saying go through the process so we can learn."

When evaluating the district's website, the dedicated SPSA page defines the plan as a way to "identify and address the instructional needs of students and specifies how categorical

funds provided through the Consolidated Application will be used to accomplish the goals outlined in the plan.” This includes reviewing performance data, describing strategies to enhance student learning, and discussing student progress monitoring plans, interventions, professional development, parent engagement, and funding. Stakeholders must be involved with the creation and communication of plans.

According to the conceptual framework and the literature review, I specifically asked about the superintendent’s point of view on student testing in the traditional sense of collecting data. He asserted, “Assessment is multifaceted.” His approach to standardized testing is to implement cycles of showcases, inviting parents throughout the year to view the end product of student work: “Trying to compete right now to say no, everybody must move away from testing is not going to happen because parents and colleges are still looking at grades, even though grading and testing is transitioning.” So, for now, until society changes, the district continues to support tests and grading while creating pathways for students to showcase the various skills they learned through capstone projects: “The more we have these [showcases], the more parents will see and understand the deeper learning experiences students are having.” Within the authentic reflective process, the superintendent will accept test scores as a measure of student growth, but as research has shown, IBL does not improve test scores, so the hope is to create an environment for growth in the testing space for principals to move past numbers and toward project showcases. Research supports other assessment practices through goal-oriented feedback, growth portfolios, community accountability, and project impact (Hattie, 2012; Milner & Lomotey, 2011; Shute, 2008).

Producing and Resourcing Through a Symbiotic Relationship With All Stakeholders. Creating a learning organization full of various support systems, coaching,

professional development, and sourcing of project materials comes with fiscal challenges.

Buildings that lead to future learning and industry support, including mentorship opportunities for leaders, teachers, and students, require money. Per board documents, many board meetings have approved budget allocation to consulting firms, professional development firms, and educational materials along with building maintenance. The superintendent specifically recognized the blessing of being in a district that always supports student growth through voting for school bond measures. He stated,

This is a political place. That's why I always must have allies. I'm part of this group and that group. I'm part of Rotary. I meet with a city manager, a college, and different political groups, but my biggest allies are my parent groups.

The district spent 2 years building affinity PTA groups, an African American Parent Advisory Committee, and a Latino Parent Alliance: "I equip them and train them on what we are trying to accomplish here." Within the political system, some parents do not know or understand the change toward IBL and are pushing back. The superintendent simply understands that the status quo will try to keep the status quo:

We spent [2] years developing the African American Parent Advisory Committee. They meet every month. They bring in speakers that discuss issues that affect the Black community. Affinity groups are open to every parent to participate, and more affinity groups are currently being added.

The importance of leading from the middle also affects the way initiatives and projects are funded. When school sites create their SPSA, they must also submit information on professional development and other resources needed to make their initiative successful. As teachers' lenses widen through awareness of various institutional barriers, their voices are heard,

supported, and, most importantly, funded by bond initiatives. Table 17 reveals how this district identifies and allocates resources and funding to school sites and teacher initiatives.

Table 17

Producing and Resourcing Initiatives From the Middle

Resource	Verbatim
Board support	And then [the board] went on to describe some of the issues. We've done a lot of stuff in literacy, coaches, this and that, and poured money here and there. I told them that's because you were hitting the wrong target. You're trying to clean up something that is rotten. It's not going to work. You must tear this thing up and start again,
School initiatives	Then all of a sudden, people go to work and have questions, and what about funding? I don't worry about that. I'll get you the funding you need.
Tied to LCAP	So, now, you will take SPSA, and you've got to align it through LCAP goals. And then in June, you're turning it into me, I pay, I deploy your resources.
Partnerships	We probably have more money than most districts because of what we call basic aid, and then the partnerships with the city, and partial taxes and all that. So, we are paid pretty well. We have a lot of support, partnerships with businesses, and so on. And then academically, based on traditional testing scores now that our students do well, though we have an achievement gap.
Bonds	So, I separated the bonds, the \$485 million school bond over there was the biggest addition, \$200,000. So, you add that together, that's almost \$700,000. That's almost a billion dollars. So huge. Both passed at 72% because [the community] loved that [PBL] concept.
School transparency	I need you to make visible everything you're doing, your projects, your game plan. Your SPSA has to be open. It's not one of these documents you just write up. This is what you live by how you spend your money, the actual plans, your vision, and everything needs to be public domain. And in fact, I want to make it all visible.

The Employment of Shared Vision and The Impact on Parents. When asked whom the superintendent considered allies, he said he considered his school board's members his primary allies in his change initiative, but that comes with spending much time continuously educating them about the what, why, and how of what he is doing, explaining adjustments and iterations of the plan, and providing context for the push toward equitable student outcomes. In return, the superintendent noted, "We protect them by being good." Other major allies are the parents from the established affinity groups. Due to the affinity PTO groups, along with the general PTO, parents have a platform and voice in the change process. The allies in the shared vision transfer-affinity groups come to board meetings to support initiatives. In each group, the superintendent fosters relationships and gives all parents pathways into leadership, amplifying a co-constructed learning community whereby the parents are educated on how this new style of pedagogy will give their students access to the future workforce. Lastly, the superintendent again reiterated his relationships with external stakeholders within the community (i.e., Rotary, NAACP, the city council, and various other organizations and businesses).

The staff, especially the teachers, have been the largest help in this change process. Due to his theory of action of leading from the middle,

Remember the whole design of the middle? That's brought me more credibility than anything else, moving us farther than anything else. Everything ties back to the theory of action, where there is shared accountability, a culture of learning, and continual reflective practices.

The superintendent knows that there is much success in this area because school sites and staff professional learning communities (PLCs) come to him now for advice on how to remove barriers for students. One high school English teaching staff came forward and asked for his help

initiating conversations with their parent community about leaving behind AP classes due to the lack of access to the curriculum for all students. The teachers saw the inequitable divide between White students and students of color. When they tried to engage in dialogue with parents about their plans, the community pushed back. That Friday, the teachers were to have another meeting with the parent community to discuss the reasoning for a curriculum change. The superintendent told them that their best course of action was to allow everyone in AP classes and discontinue the remedial college prep courses. This is one example of teachers taking ownership over all students' academic well-being, giving teachers a voice in the plan of action, and then, as a district, supporting teacher-led efforts toward equitable teaching practices.

Successes and Challenges. During the interview, the superintendent specifically cited various successes and challenges. He spends much time educating all internal and external stakeholders on what good is by asking questions, being a thought partner, and giving agency to the students. This allows him to be a *guide to the side* in many of these difficult conversations that surround equitable systems and teaching practices. His proudest success to date is giving space to support his theory of action. He understands that the process will take about 10 years to have a lasting effect on the organizational culture. He is now finding that teachers have been creating their own initiatives, just like the literacy teachers who wanted to remove AP classes: “You set that framework of what has to happen, but you let them fit into it with their approach.”

Innovation USD is a highly political district, so transparency is key. From school SPSA being public to continually educating the public on initiatives, these challenges are taken as part of fighting the status quo. The real challenge for this superintendent has been trying to get principals to understand and implement restorative justice practices at each school. COVID affected this implementation because principles were too busy. He was wondering if he should

push harder on the principals, but if he did, we knew that it would become a top-down initiative where principals would say, “The superintendent wants us to do this.” He hopes that reflecting on equity four times a year will help clarify the need for principals to embrace restorative justice practices at their school’s SPSA.

The district's future is unknown; there have been short-term wins through establishing leading initiatives on equity from the middle, organizational learning practices, and implementing IBL. According to the superintendent,

How do we know that we’ve arrived? What I say through this process is, if we can be predictive of outcomes is when I know. I want to be predictive of the outcomes of how our students are going to do based on this work here.

The aim of the reflective cycle is to have a better understanding of where students are in the moment and will help with having informed predictions.

Results Research Question 2

Research Question 2 asked the following: How did those leaders experience the vision, imagine the vision through planning, and transfer the vision throughout the district? In Research Question 2, I sought to understand how each participant processes the vision to carry out their own theory of action. Research Question 2 produced three findings (Figure 7) pertaining to how the superintendent’s vision for change was experienced, produced, and employed at the school district. Findings are (a) lived experiences outside of education, (b) contributing to and supporting the organizational learning culture, and (c) employing initiatives through the development of relationships.

Figure 7*Findings for Research Question 2***Lived Experiences Outside of Education**

The importance of moral purpose was also a strong theme throughout the series of interviews with Innovation USD leaders. Aligned to the superintendents overarching strategic vision and plan, each created value by exercising their creativity in the plan to catalyze the transfer of vision at the ground level, impacting student achievement. Each leader had a strong passion for change, but their personal narratives were also as interesting as the superintendent's path. Table 18 describes how the participants' lived experiences impacted the personal value they bring to this change initiative and how they experienced the vision of IBL in the district.

Table 18*Moral Purpose to Planning*

Moral purpose	District leader	Plan
Equity, strategic	Participant 1	Community of learning using evidence-driven frameworks Resourcing teacher-led initiatives Iteration based on impact
Creative, theater, teacher	Participant 2	Integration of vision into current planning Research to action Resourcing Public tours
Creative, relatable, entrepreneur, lead teacher	Participant 3	Using frameworks and experience to drive change Scaling programs Being a connector
Equity, lead teacher	Participant 4	Creating professional development Continual interactions

Two participants were hired into the system, and two had over 15 years of experience at Innovation USD. The two participants who were in the system prior to the new superintendent's arrival self-described as creative individuals. One participant went the extra mile to say that he didn't even want to be a teacher but went through credentialing because a college academic advisor encouraged him to have a more stable career by becoming an educator and have his summers free to pursue his other interests. The other participant, a long-time employee of Innovation USD, had a unique journey into the school system by way of managing and directing plays and taking part in large productions. When the new superintendent arrived, each leader was already using their creativity and backgrounds to create spaces of opportunity for IBL initiatives. Participant 3 was promoted to the district office due to the various IBL programs he started

throughout his teaching career. The other two participants were hired into their positions at the district, so the superintendent appointed individuals aligned with his shared vision.

Each participant believed that IBL practices were key to student engagement and an equitable education. Participant 4 noted, “I feel like the social justice framework is the big picture, and it serves as an umbrella for everything else that’s done in the district.” Participant 1 spoke about the dedication it takes to work towards equitable education for all students, saying, “I feel that this is the place where I need to be because I will do whatever I can to support that vision as hard as it may be and as much resistance as we may get because I know that we are all working towards that common goal.” Participant 2 had a specialty in creating theater productions and teaching acting. His idea of good teaching aligned with the new superintendent’s plans citing, “What they’re calling 21st-century learning is what I call learning.” Participant 3 was so passionate about IBL for students that he created a limited liability company separate from the district to run his projects through the school year and summer breaks. He felt that it was divine intervention that he was doing exactly what he embodied for students: “I couldn’t believe I was gonna get the opportunity to do what I had been trying to do for students.”

The superintendent’s strategies also transferred to the leaders in the district. One participant, for example, did not use the term “lead learner” but described meetings with teachers where she specifically wanted to guide them toward the district vision by asking questions, noting their ideas, and creating a professional development plan for them to learn more student engagement techniques. Another participant used the term “learning community” to refer to the district staff collectively, which reiterates the construct of being a learning organization. The SEL component is being revamped and will be integrated into the IBL curriculum this fall as it is imperative to create a solid foundation for a student learning community to have a “pedagogy of

love,” as one participant commented. All leaders practice teacher-led initiatives from the middle by meeting with teachers, hearing them, training them, or placing their ideas in planning and then acting through the execution of plans.

From Vision to Planning

Each leader understood the vision and used their moral purpose as it relates to it with their own theories of action. Due to each leader having their own role in the district, each theory of action driving change is varied but still follows the framework of producing and employing their theory of action. Table 18 describes the process each participant used to push forward their plans for the vision for the school sites and communities. Each participant’s strategies will be described in detail in the following sections and will follow Sinclair’s model of production and employment and discuss how each leader measures the experiences of students/families to understand the impact of their work.

Participant 1. Participant 1 was a first-generation college student whose parents supported her formal and informal education endeavors. Education through college was considered “a way for me to be able to support my family, to assist others, and to give back to my community.” Participant 1 did much ethnographic research at school sites and always championed ways to support students like her gain opportunities she had, which she considers her driving force in education. She carried this drive with her throughout her education career and was mentored by superintendents who were dismantling barriers and providing opportunities for all students to succeed. Participant 1 discussed the aligned vision with the superintendent as a “commitment to the process of engaging all stakeholders in the work of teaching and learning and addressing the problems of practice that we face every day.”

To understand the type of impact they are currently seeing, I asked each participant to fast forward 5 years from now and see students and families who might be thanking them for something. What are they thanking them for? Participant 1 said with a tear in her eye, “For seeing them. For helping them and supporting them and for seeing themselves. For validating them and supporting them to be who they want to be.”

Participant 2. Participant 2 previously managed theaters, led productions, directed, produced, and even taught at the university level. As an artist in residence, Participant 2 went to various schools and used theater to help teach math and science: “We would figure out ways of using the proscenium theater style to help teach math, science, or to help teach English. So, I immediately started to see how what we were doing in facilities could align with 21st-century learning.” Research on using theater programs to teach math and sciences to students showed positive results from connecting the experience to learning. One key finding from research in arts and science education is that “the arts transforms the environment for learning” (Fiske, 1999, p. ix). Fullan (2011) also discusses the importance of transforming the environment during the change process.

When planning for change in the district, the facilities staff drafted their own guiding question:

What do our facilities need to be to support learning for the 21st century and beyond? We did a very full and very in-depth education specifications study and compiled our findings into our presentation document, which is an aspirational document.

The team coordinated with the assistant superintendent of instruction, several principals, and teachers who helped develop new ways of imagining a classroom:

You know, the first big thing is our little 960-square-foot classrooms. This was an idea built by the fire marshal 100 years ago and not by an educator. We need more space, more flexible room to teach in different forms, modalities of learning, to be able to engage the indoor-outdoor relationship with learning, and natural light because research shows that airflow can improve attention and retention for students. All of these ideas became clear to us through this study.

In the presentation document, there is an outline for 21st-century learning and how the new buildings will enhance the learning experiences for all students through moveable wall consoles, showcase areas, and moveable furniture. These ideas are all tied to various research and successful learning models. The plan details each classroom from transitional Kindergarten through Grade 12, maker spaces, community labs, and redesigned library and media areas. The plan connects all upgrades to how the designs will enhance student learning.

When asked the question of the type of impact, Participant 2 considers much of what he does invisible to students and families but wants to make sure that the facility creates a strong condition where learning may occur at a high level:

Let's say we're doing an engineering program. They would say, "I really got my hands on stuff, and I really developed skills that taught me and prepared me for my career in my life, and it opened up where I was going." If I could say that facilities were a partner in that program by creating the condition because we don't teach anyone anything. So, I hope someone says, "Yeah, I was in that building!" I can say, "Yeah, I did that."

Participant 3. Participant 3 also had an unconventional route to teaching. At the school district alone, Participant 3 created several programs as a teacher, including a hands-on college and career summer program for students where children worked side by side in classes with

college students. Participant 3 also had a program where he taught students how to be leaders at the school. He takes pride in his creativity and ability as a lead teacher, helping to scale IBL initiatives at the school district. He truly considers himself the lead teacher in this area of IBL and an expert in career technical education (CTE): “I’m here director of learning and innovation, and it felt strange because nobody knows what that means.” It was a new position.

He considers his job as officially scaling what he was already doing with the district as a teacher and leading other teachers to be as successfully creative in their classrooms as he was.

When I asked how students are experiencing IBL, Participant 3 showed a bracelet on his wrist from a complex IBL project that was a passion project from a new teacher that hadn’t gone through his official training yet but was taught the strategies from the staff at her school site.

They’re doing a program that is dealing with students in another country and improving conditions there. It’s so integrated, so much passion, and they are proving that you can do all of this and still hit the standards and be rigorous.

When asked about what students were thanking him for in 5 years, Participant 4 responded, “If they knew what I did, they would thank me for having a vision for their lives and opportunities. Bringing them opportunities.”

Participant 4. Participant 4 always wanted to be a teacher and considered being an educator her calling. As a veteran teacher, program leader, national board certified, and two-time county teacher of the year award winner, Participant 3 takes ownership over moving theory to practice. What intrigued Participant 4 about her position was the large movement happening in the district. Participant 3 views her role in more broad terms, which is the move toward culturally relevant pedagogy and the integration of social justice standards: “My role was pretty clear when

I started. They had a plan. There's the social justice framework, and my job was to help lead the implementation of that."

The district's plan is her plan, and she uses the social justice framework as a tool in meetings. The key modality used was monthly meetings with lead teachers in history, being the lead learner, and creating specific professional development targeting identified needs.

Participant 4 described her role as lead learner: "I elicited [teacher's] responses, but I knew where I wanted the discussion to go. After taking their responses, I wrote a professional development plan." Participant 4 creates professional developments around the needs of the schools she visits and rounds of inquiry visits to review teacher behavior and student engagement: "My role is taking what the sites need and making it mesh with what the district is articulating."

The enactment of shared accountability is being implemented in Participant 4's work as she is the lead learner gaining insights from the teaching staff, building a professional development plan, and then reviewing the impact through conducting rounds of inquiry. As for resourcing, Participant 4 follows the protocols set forth by Participant 1 and feels that the district has always been supportive in giving resources for all teacher-led initiatives. When asked about how students might thank her in 5 years, Participant 4 said,

What I would hope to hear is that they are thanking me for making the classrooms that they were in places where their curiosity was honored and the intellect stimulated. Where they are made to feel a part of a classroom environment and that they found the study of history joyful and meaningful.

Contributing and Supporting the Organizational Learning Culture

The second finding in relation to Research Question 2 revolves around the impact of the cabinet team in fostering the vision, mission, and organizational culture through supporting and contributing to the collective knowledge base of the organization. Gathered from interviews, review of district documents, presentations, and synthesized from each participant's personal narrative, each district leader designed qualitative research, encouraged rigor in understanding evidence-based research, provided and facilitated professional development opportunities, and evaluated the impact of acquiring new knowledge on students and families. This process of creating a solid learning organization is supported by much research as a way of changing the culture within an organization overall (Fullan, 2011; Kezar, 2001; Schein, 2004). Where the superintendent of the district's focus was to help all stakeholders gain a shared understanding of purpose and mission, the district leader's mission and purpose for growing a learning organization were to move theory into practice. Understanding how each participant contributed to the knowledge culture of the district was synthesized through a filter of relating the various processes placed district-wide to produce the human capacity needed to change the pedagogical practices in the classroom.

Using Research to Plan

When asked how the superintendent's vision transferred into their plan, Participant 2 linked the vision to current projects, as they conducted qualitative and desk research, innovated, prototyped, and then iterated. The implementation of the new type of facilities came through a plan already created and funded due to the department's prior-year LCAP goals. The windows, floors, and doors project coordinated with the first step in enhancing students' classroom experience by creating more light and better HVAC systems for airflow. This project flowed into

the 21st-century furniture project, which changed every classroom to be more flexible through the furniture:

We find that furniture touches every student every hour of the day. Our research found that our little 960-square-foot classrooms was an idea conceived by a fire marshall 100 years ago. As we interviewed educators, this space doesn't work. They need more flexible room to teach in different forms, different modalities of learning. It is important to engage the indoor-outdoor relationship with learning. They need natural light, and studies show that good air quality can improve attention and retention engagement for students. We just needed to place all of this into the buildings and facilities for students.

From this project, they began designing and transforming the buildings into learning spaces, led by teachers and principals at each school site. With each new design, schools can reconfigure the learning configurations, and facility managers can upgrade the buildings in the future:

“Academic spaces have raised floors, where air, data, water, electrical, everything goes under the floors. So, over the summer, we can reorganize and reconstruct the inside of the building.” Due to student experience being at the forefront of the facilities department, Participant 2 also understood how parents might not understand the need to change facilities or learn from the education they received in the past. Therefore, conducting community sessions where various stakeholders walk through facilities and classroom spaces with teachers and principals at various school sites helps educate the community about how each space creates a better environment for learning.

In the first several months after accepting his position, Participant 3 needed to present to the school board and community what the IBL tenets would be. He explained that his

presentation was a study session around what 21st-century learning should and should not look like 18 years into the 21st century. Out of the study session came four initiatives: IBL schools, district-wide professional development, capstone learning experience, and CTE. Everything needed to revolve around industry, real-world problems, and solutions and be project-focused. This was the superintendent's working committee on IBL. The steering committee began researching by surveying and interviewing eighth-grade students about what they wanted from school. Several questions were asked, including, "What do they wish they had in school? Would they enjoy something like this or that? So, that laid the groundwork for the PBL pathway." Participant 3 felt that he was supported in moving from teaching to scaling IBL initiatives in the system through having clarity in role and responsibilities, support from a steering committee, and support from a community liaison to help co-chair the committee.

The recurrence of research centered around end-user voice helps support the process of being a learning organization and feeds into current research on agile business models (Silva et al., 2019). Departmental research collected throughout the process from planning, implementation, and iteration cycles centered student, teacher, and principal voices in their research coupled with desk research and conducting tests which align with the agile process of continually gaining customer input when designing and producing new products. From the discovery phase through implementation, students were engaged to help shape the new process of pedagogical practice and facility design. Teachers and principals gave much input into the new facilities' design and helped to educate the broader community on how the facilities help support student learning. Research guided by student voice was centered on department plans and implementation, while action research was conducted simultaneously to help test various

implementations to gain further feedback on how various stakeholders were experiencing the new innovation. Thus, continuous improvement was guided by end-user experience.

Using Existing Frameworks to Help Guide Discussion

Building capacity revolved around the guidance of multiple frameworks used by directors with specialties driving the language of math integration, literacy integration, and science integration in the curriculum. When I asked about what processes the district used to build teacher capacity around IBL, Participant 2 explained,

We develop multiple frameworks that support us and are able to strengthen particular areas to integrate subject topics, i.e., science, math, and literacy. Then we provide the professional development around how to integrate the various disciplines and how we use [IBL] to really support students in having a deeper understanding of literacy through science, of literacy through mathematics, and or history, or social science, so really infusing those pieces within that space and making sure that district leaders are partners in making those connections.

Frameworks were also important to Participant 4, stating, “The social justice framework is a clearly articulated framework which has academic rigor built into it.”

When addressing teachers and parents who might be concerned about what is being taught in the classroom as it relates to social justice, Participant 4 simply brought them back to the state framework citing,

We don’t teach whatever we want. California has one of the most progressive frameworks in the nation. So, I ask them to tell me what grade level they are interested in and then ask them where it aligns to the state framework.

Participant 4 also has led professional development for teachers to unpack the state framework and standards and align them to the social justice framework.

Participant 3 consistently used frameworks from his first presentation through to implementation and now has begun to blend various frameworks, adding to the initial BIE framework that the district initially began with:

So, I created a framework on how to solve problems. I started using that in elementary school based on word problems. Now, we use it to help solve real problems because they can broaden that out into anything.

Through the use of frameworks, each participant helped educate and build capacity toward growing knowledge in social justice, IBL, and how to integrate subjects to target student engagement and educational growth.

Using Targeted Professional Development to Produce Impact

Participant 1 discussed how as a community of learners, all stakeholders come together around a school site's identified problem of equity and begin to problem solve as a collective. Once a possible solution is identified, the district deploys resources to support any materials, training, or coaching needed with the intention of providing proof of impact. According to Participant 1,

Our school sites have leadership teams, and within their leadership teams, they've identified their strategic focus and the best practices or instructional strategies they would like to develop. They identify what professional development needs they have as it relates to implementing IBL learning, and then we allocate funding for those areas of need.

There has to be a connection between what the evidence of student learning is telling us

[and] what resources are needed to support the professional development that will impact the learning needs.

Once funding has been allocated for professional development, district directors conduct equity visits to ensure that teacher behavior has changed as evidence of impact in the classroom: “So, there are different levels of impact. It’s not just always the end result of student test scores.”

When explaining that the true impact of behavior change on students might not happen for 2 to 3 years, Participant 1 discussed how leaders look for how professional development impacts the delivery of lessons, how students are responding to the change from what they are experiencing during lessons, and how teachers are monitoring and measuring each student’s progress.

The concept of district leaders as lead learners was supported distinctly by Participant 4 when describing her role when meeting with school site leaders and leading professional development. When discussing professional development she had with teaching staff a couple of weeks earlier, Participant 4 discussed how she was able to ask questions around many students using their mobile devices during instructional time:

I asked a question based on what I saw and asked how we could address that issue. I already knew where I wanted to guide the conversation but wanted the teachers to have ownership over the solutions they created. I wrote down the teacher’s solutions on a chart and told them that I would design a professional development around their ideas on how to correctly implement them within the classroom.

This is a clear example of how the superintendent’s plan to lead initiatives from the middle has transferred into the actual everyday work that district leaders do as they support the learning organization. Participant 4 prided herself on her ability to initiate an open discussion on a problem through questioning techniques, guide the conversation with the district vision in mind,

and then allow teacher voices to be heard, supported, and acted upon at the district level. This is the fostering of collaboration through the monthly team meetings, the professional development, and Participant 4 mentioned district-resourced book clubs that started at school sites due to the resourcing and support of the district following educators' voices.

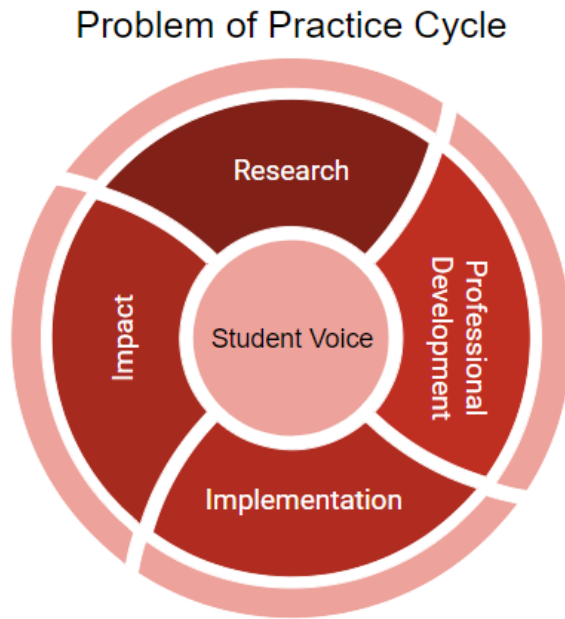
While many school districts felt the impact of the COVID-19 quarantine as they tried to fill the digital divide with devices, internet connectivity, and teacher preparation, Innovation USD saw how educators directed and launched even more real-life experiences on a digital platform. According to Participant 3, resourcing for IBL initiatives took a downturn after the 2019 implementation due to backlash on spending issues in the district. As explained, "We were putting money behind it, and there was backlash. There was a perfect storm for backlash because our population was shrinking in the district, meaning we had to let go of some teachers." Thus, all directors had to tone down, which affected a large contract with PBLWorks. Instead of copying their materials, Participant 3 began widening the training lens for the district by blending BIE protocols with more research and connecting with people and resources from other site visits:

I took other training from other organizations and distilled what I felt were the crucial elements, and I created my own training along with our own resources for our own planning guides. So, I created resources that were portable, and now teachers have over 100 links to different videos so that they can learn.

When the pandemic hit in 2020, the district was poised to continue its IBL initiatives because Participant 3 had already created the digital modules that were stand-alone training. This instance is also concurrent with how Participant 3 considered himself a creative in the district, lending more insight into how each participant iterated their own theory of action plans.

At Innovation USD, there was a consistent underpinning of how the superintendent afforded the freedom for individuals to advance the vision through their own theory of action, for which district leaders were empowered to act consistently with the new vision and sustain their commitment to it (Kantabutra, 2010) further contributing to the collective psychological ownership (Martinaityte, 2019). Each participant used professional development with the intention of seeing evidence of changed teacher behavior which in turn impacted student learning experiences.

The second finding from Research Question 2 involves how each participant discussed their role in supporting the culture of learning at the organization through a cycle of recognizing a problem of practice. Figure 8 synthesizes the strategies the participants used as they were moving their plan into action at the district. In support of the superintendent's theory of action as it related to teacher-led initiatives to create a learning organization, participants used their lead learner influence to guide school sites toward identifying problems of practice, collaboratively researched best practices using various frameworks to help guide practices, and then resourced the professional development and coaching needed to implement targeted programs to monitor the impact. All participants used student voices throughout the process, gaining immediate feedback on the new strategies employed in the classrooms to iterate if needed. The cycle began again through the established equity visits, SPSA reviews, and professional learning communities aligned to the superintendent's theory of action, for which district leaders turn into lead learners who were able to co-create new possibilities centering teacher voices and correlating with the superintendent's original vision of leading from the middle on all pedagogical initiatives.

Figure 8*Problem of Practice Cycle****Employing Initiatives Through the Development of Relationships***

The third finding pertaining to Research Question 2 was the intentional focus on building internal and external relationships with all stakeholders. This finding correlates with many statements made by the superintendent indicating how important informal and formal relationships are in the change management process (Fullan, 2011; Liou & Daly, 2019). Fullan (2011) makes a strong connection between how a leader ignites others to their moral purpose through relationship building and developing a shared concept around what needs to be implemented within an organization. In the same way, Innovation USD leaders build relationships to ignite others with the same moral purpose towards an equitable learning environment for all students and create a shared understanding of the moral purpose to help the

district gain more financial resources from the community as well as a deeper collective psychological ownership over all students' learning experiences at the district.

According to Participant 1, relationship building in the district also helped build their learning organization: "The building of relationships, connecting with our teachers, our families, and our students to bring everyone along as we engage in this journey is really powerful." Participant 1 also placed emphasis on the parent affinity groups along with the overall PTA, stating, "It's really about connecting with them, sharing the narrative, and clarifying any misunderstandings that might be out there." Engaging with families to control the narrative of the district was also emphasized as "in the absence of the narrative, we all make up stories to make sense of what is happening." Participant 1 correlated information from the superintendent's interview when saying, "Our parents are, in fact, our allies when things become difficult." Participant 1 also considers the teacher's union as a strong ally in the district as they continually center teachers' voices with the development of all the initiatives. The community overall trusts that the district, in coordination with teachers, is trying to elevate students in all of its initiatives.

When asked how the district funded this organizational change toward IBL, Participant 1 discussed their relationship with the community at large: "The community really comes together. They have different [bond] measures they've approved to support teaching and learning and to enrich students' experiences." Participant 2 thoroughly explained the continual relationship with the external stakeholders. To enhance and reconfigure the buildings, created partnerships through leasing agreements.

When I walked into the district, I was hired to manage a new theater the district just renovated. They made about \$70,000 per year renting facilities. Eventually, I took all the facilities and rented them for filming, leases, and special events and now generate over

two million dollars a year, and we oversee another 24 million dollars a year that come into the district through joint use.

The facilities department has become an important part of the economics of the school district as well as the community making them a community center through partnerships. An example of this partnership is how the city relies on school campuses to provide parks and recreation for families after school and on weekends. This revenue is in addition to the bond measures passed and the normal allotment of facilities funding.

Relationships also needed to be fostered through strong partnerships with businesses to gain access to real-world industry experience for IBL projects. Participant 3 specifically spent his time as a teacher and district leader developing strong partnerships with various external stakeholders. Prior to his position at the district office, Participant 3 created numerous experiential programs for students centered around real-world skills for the workplace:

I created modules based on what I felt through research was telling me were important in the workplace. I had friends at Google. So, we went to Google, Hulu, the fire department, and architectural firms to help solve problems within various industries. It was a learning experience involving a dynamic problem-solving activity where students would come out with industry terms and industry ways of doing things. It all relies on relationships in the industry.

As a teacher, Participant 3 relied on his relationships with all industries, such as actors from TV shows acting out student-created plays about their lives and using public transportation instead of school buses to enhance navigation skills. Also, instead of providing college tours, Participant 3 sent students to college to work alongside students in science labs or play real basketball games with college cheerleaders and college band included. Bringing immersive experiences to students

is a highly personalized endeavor: “One thing I learned is if the group is small enough, you can get into the boardroom. People will do anything for kids.”

Along with using external relationships with industry, Participant 3 also developed relationships with IBL practitioners from various organizations and built great relationships with the CTE accreditation officials and with internal district stakeholders. When asked whom he considered an ally while moving the shared vision into the district, he mentioned internal and external stakeholders by name. Internal and external relationships have been a strong influence on gaining resources for student success and gaining access for students to engage with industries to help work through real problems.

Participant 4 relied on her strength as a teacher to develop internal relationships with lead teachers at school sites. She builds relationships is by “rolling up my sleeves and letting teachers know that I am here to serve you.” Along with being a servant leader, Participant 4 also prides herself on knowing where teachers might resist professional development. Thus, she “examines the barriers of resistance so when presenting, I can help make the information meaningful to them and motivate them.” When asked whom her allies in the district were, Participant 4 discussed how she relied on other specialists at the district as they continually shared resources impacting students’ lives.

The most important relationship the district has is with its students. Students’ experiences, family experiences, and their voices are continually heard, valued, and acted upon to create a better learning experience. When discussing student experiences, Participant 1 posited, “We are continuously seeking to get more input from our students to have more student voice, whether through focus groups or surveys, to truly get at how they are experiencing

teaching and learning.” This idea of discovery and gaining input from end-users speaks again to the agile nature of Innovation USD (Silva et al., 2019).

Summary

This chapter reported the findings from five interviews to better understand how a shared vision toward equitable IBL practices evolves throughout a district. The results from this study indicated that a shared vision begins with a strong moral purpose usually obtained by lived experiences that transfer into a theory of action to imagine new possibilities for the district. Within the theory of action, the superintendent set goals for each school and created pathways, centering teacher’s voices in the development and innovation of new initiatives. To transfer the vision throughout the district, findings indicated a strong learning organization helps to produce teacher capability toward IBL best practices growing collective psychological ownership and supported by all leaders. When employing the new initiatives from the school sites, simultaneous relationship building must happen with internal and external partnerships to help with financial and industry partnerships. The full process begins and ends with student voice, parent empowerment, and multilevel cycles of reflection.

Chapter Five will present a summary of the research findings and implications for practice. Recommendations for future research will also be presented.

Chapter Five: Discussion

Chapter Five summarizes findings related to implications for practice in the educational community. This chapter discusses key findings and a framework for how shared vision spreads throughout Innovation USD. The intention of this chapter is to give other superintendents an opportunity to act forward toward fourth industrial change in education. The chapter also presents recommendations for future research.

This study focused on how districts can shift pedagogical practices from a factorized 2.0 model of learning toward IBL practices that will deliver equitable access to Industry 4.0 for historically marginalized communities of color. Research showed many intersectional problems that enclosed diverse populations of students long before the Second Industrial Revolution's influence on the school system (Armstrong, 2012; Trotter, 2000). Through a CRT lens, research illuminated how various innovations were extracted from enslaved Africans and then from the same population using laws and the patent system (Armstrong, 2012; Crenshaw, 1991; Trotter, 2000). During the Second Industrial Revolution, eugenic testing measures became the norm, which has today precluded the same communities from advancing past standardized measurements of learning (Au, 2007, 2014). As the world moved past standardization of learning toward IBL practices, research has found that schools that cater to diverse populations are not implementing IBL strategies with fidelity, thus locking our students of color and ultimately locking them out of the future job market (Mehta & Fine, 2019). The purpose of this study was to provide insight into how a superintendent creates and transfers a shared vision throughout the district. By studying the process of conceptualizing, producing, and employing a new shared vision in a school district, the research can center around the output of such a change in how the end-users are experiencing the district's direction. The following questions guided this research:

1. How does this superintendent imagine, plan, and spread his vision for the future to other leaders within the district?
2. How did those leaders experience the vision, imagine the vision through planning, and transfer the vision throughout the district?

This case study implemented a semi-structured qualitative protocol rooted in a constructivist questioning theory called appreciative inquiry (Creswell, 2016; Ludema et al., 2006). Appreciative inquiry with a qualitative format allowed participants to reflect on their vision, processes, and strategies for transferring their vision in the district. This research design used purposeful and sampling to select participants (Merriam & Tisdell, 2016). Due to their roles in the district, this study focused on the superintendent, assistant superintendent of instruction, chief operations officer, director of innovation, director of equity, and director of ethnic studies. Interview data were analyzed using inductive coding to allow for organic themes to arise for which findings resonated and fell within the conceptual framework.

Findings

Study findings suggest that having a moral purpose for oneself and as many stakeholders as possible is imperative to organizational change. Findings further suggest that a strong moral purpose leads to a theory of action, which is imperative to organizational change. The questions that center this study are grounded in understanding district change regarding introducing IBL teaching practices. Research shows that more technology research needs to focus on how technology impacts communities of color (de la Peña, 2010; Sinclair, 1998; Trotter, 2000). Trotter's (2000) opinion of technology includes any new type of product or process introduced to marginalized communities. Meanwhile, Sinclair (1998) discussed that the introduction of new technology should be viewed through the lens of how it is imagined, produced, employed, and

experienced among Black communities. This study specifically used these ideas to create a conceptual framework on which findings centered.

Eleven themes emerged related to the study's two research questions. Research Question 1 centered around the superintendent's vision, where he set forth various systems and processes that were later correlated by board meeting notes and participant presentations and reinforced through the other qualitative interviews from the participants who helped answer Research Question 2. This section presents a summary and discussion of the study's findings which culminate in a possible framework for future research to examine how shared vision is transferred in a school district.

Research Question 1

Research Question 1 inquired: How does this superintendent imagine, plan, and spread his vision for the future to other leaders within the district? Qualitative data related to Research Question 1 produced three findings. The first finding was that the superintendent's lived experiences contributed to his moral purpose towards equity and IBL practices, which ultimately led to the theory of action plan presented to the school board. Fullan's (2011) work supports a strong moral purpose for a leader in organizational change management and specifies that moral purpose drives a purpose-driven plan in creating coherence in an organization (Fullan & Kirtman, 2019). In the imagination portion of planning for change, a leader needs a strong moral purpose, enhanced by creating an urgency towards change (Kotter, 1996) for other leaders to begin to ideate in their imagination.

The second finding is that the superintendent continually referred to setting up conditions for internal leadership and iteration. The notion of leading from the middle, as well as using district and school site leaders placed in the position of being lead learners, is supported by

research on creating coherence in school districts (Westover, 2020). The district cultivated a collective psychological ownership that anchors the superintendent's vision and mission via a continual focus on having each school create its own theory of action, address pedagogical shifts by allowing school leaders and teachers to decide what style of IBL fits their community, and focus on teacher voices as leaders.

The third finding was the continual dynamic between all stakeholders participating in educational growth and reflection based on student voice to align district vision, action, and output. The superintendent created a learning organization that included book studies through PLCs, consulting and workshops from professionals in IBL, and community visitations to schools and districts that implement IBL with fidelity. In turn, the regular equity check-ins from the district level centering student voices, the creation of parent affinity groups within the school district, and the regular evaluation with principals on their SPSA plans create continual growth and reflection points in the organizational structure. The superintendent also stressed the importance of using parent groups and student voices to understand if the effort at each school was elevating student growth and allowed the schools to make immediate changes without waiting for end-of-year testing scores.

Research Question 2

Research Question 2 inquired: How did those leaders experience the vision, imagine the vision through planning, and transfer the vision throughout the district? Data analysis related to Research Question 2 produced three findings. The initial finding was that lived experiences outside of education help with the planning and iteration of shared vision and the transfer of shared vision. All but one interviewee had ambitions to pursue other careers prior to going into education. Each participant with a background in fields other than education used their expertise

to enhance their innovation toward IBL pedagogical practices. The sole participant who was a lifelong educator may have been an outlier in this study because they were passionate about the vision but, from an organizational view, mostly followed district plans aligned with the superintendent's vision without iteration. The other participants noted that they came into education from different points of view, and these views ultimately enhanced their understanding of the superintendent's vision through implementing their plans. The best example is that the chief operating officer considered himself a strong communicator between educators, architects, and construction workers due to his innate understanding of theater and his short time as an educator. This marriage of the world outside of education and the superintendent's vision helped align more innovative planning and various strategic iterations within each participant's role, helping to move forward the vision to all stakeholders.

The second finding in relation to Research Question 2 was that each participant contributed to the organizational learning culture by being lead learners and resource providers. They were the guides to the side, along with the superintendent, creating conditions for learning growth for all stakeholders, including themselves. All participants discussed the importance of professional development, whether it was the planning of professional development or the resourcing of professional development. District leaders also contributed to educating the public by walking the community through their planning and walking stakeholders through buildings. Participants also considered themselves lead learners by increasingly gathering data around effectiveness, gaining feedback from all stakeholders, but mostly centering student voice in their research and asking questions on how everyone can do better towards removing opportunity barriers for each student.

The third finding was the intentional focus on building relationships with all stakeholders. From a district level of leadership, each participant cited the importance of external and internal relationships. This finding aligns with Fullan's (2011) work emphasizing knowledge-building to enhance the relationships with internal and external stakeholders. The organizational structure around leaders being lead learners again is important to the relationship of being a thought partner with the school district.

All participants considered relationship building with all stakeholders an essential part of the change process. All used their relationships with various stakeholders to help educate other stakeholders, which also contributed to the overall learning organization. When Participant 1 was asked what she would change with the implementation of the plan, she wished that her team knew how deeply she honored their work and commitment to equity. She wished she had spent even more time letting them know how important they were to her. When asked about various allies in the organizational change process, Participant 2 cited teachers and administrators accompanying various stakeholders through new buildings facilitating a change in mindset for community members who do not understand IBL and how buildings need to change to enhance learning for students. Participant 3 continually discussed their strong relationships with various businesses, IBL-focused programs, and various mentors at the district that help advance his initiatives. Participant 4 used monthly team leadership meetings to build strong relationships at the school sites, which helped transfer and advance the district's vision.

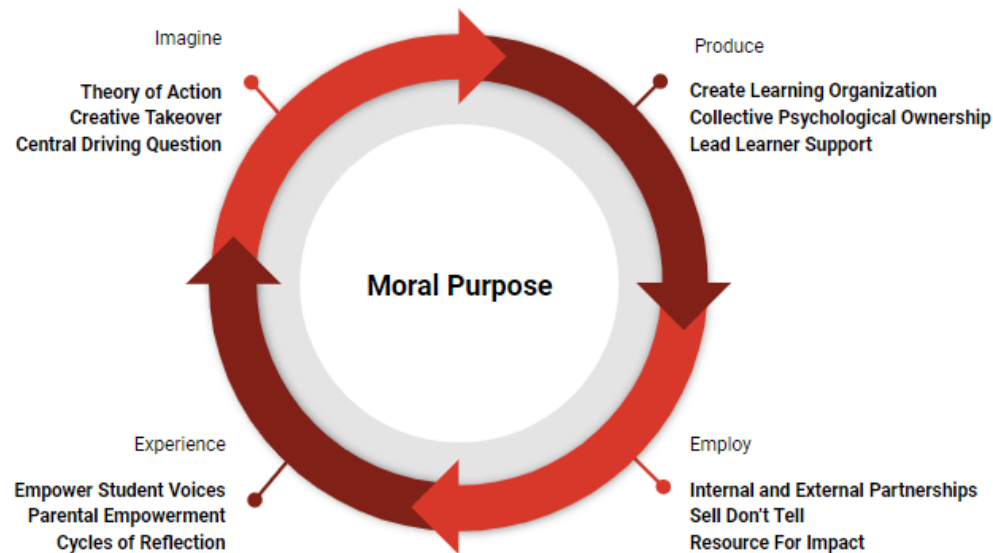
Recommendation

According to Sinclair (1998), technological history should study how technology impacts marginalized communities of color by reviewing how the technology was imagined, produced, employed, and experienced by the end-users. In this study, the new technology being examined

is a process (Trotter, 2000) that initializes the transition from a factorized second industrialized model of teaching toward IBL within a school district. IBL is considered a style of pedagogical practice that would lay a solid foundation for the technological shifts to be encountered through the ushering of the Fourth Industrial Revolution (Darling-Hammond et al., 2014; Dintersmith, 2018; van Laar et al., 2020; Wagner, 2008). Research provided in this study discussed the importance of IBL practices in affording access to the fourth industrial work model for all students. Innovation USD is a school district with a visionary superintendent with a strong moral purpose focused on equitable learning experiences rooted in real-life problem-solution project models. When analyzing the data in this study, five main findings emerged pertaining to creating and distributing a shared vision in a school district. These findings are

- moral purpose (moral purpose, impacts theory of action, innovation)
- change process as an IBL project (imagine)
- culture of continual learning (produce)
- relationships (employ)
- adjustments through reflective cycles (experience)

Figure 9 is a visual representation of the five findings as a possible framework for future superintendents focused on aligning their school districts with the fourth industrial workforce. The interpretation of the transfer of vision components of the conceptual framework can be illustrated in the following diagram as a cyclical and ongoing process. The overarching moral purpose serves to ground the individual practice and subsequent theories of action in the shared leadership structure launching with the superintendent's moral purpose.

Figure 9*Shared Vision Framework for the Fourth Industrial Superintendent***Moral Purpose**

Organizational change revolving around leadership's moral purpose is well documented in research (Fullan, 2011; Fullan & Quinn, 2016; Kezar, 2001; Kotter, 1996; Senge, 1990; Westover, 2020). The first significant finding at Innovation USD was the various divergent perspectives presented and most of the participants' multidimensional nature. All but one interviewee came from a background other than education and found themselves being translators between educators and industry, creating a divergent type of thinking model. Design thinking research specifically considers positive deviance an essential component when designing an innovative team (IDEO, 2015). Within a team dynamic, positive deviants are classified by having knowledge of two domains or more, lending more to the iterative processes of solving problems through human-centered design projects. At Innovation USD, positive

deviancy lent itself to the alignment of shared vision transfer, integrated itself into each leader's theory of action plan, and carried over into various iterative models.

Qualitative data revealed an outlier, as one participant was a career educator who always wanted to be a teacher. The participant shared the superintendent's vision, but the transfer of that vision was distributed throughout the district and mirrored the superintendent's strategies to carry it out. Behaviors of lead learning were noted when participants were invited to share innovation about the transfer of shared vision. However, there did not seem to be authentic innovation to deliver the vision and mission. In other studies, this participant would be considered normal, but in this study, certain differences dealt with the establishment of the status quo. Positive deviants continually iterated by finding ways to disseminate the district's messaging with internal stakeholders and found innovative ways to interact with families, leverage external partnerships, and create value for the community at large. Even though the analysis did not amplify an authentic iteration, there was still alignment through an equity lens serving as a conduit for the superintendent's vision and mission.

Lastly, moral purpose through promoting positive deviants into district positions without moving through the regular channels helped create a space for positive deviant behavior to occur. Mertens et al. (2016) discussed the difference between being a positive deviant and positive deviant behaviors within an organization. Two teachers were placed in the district office to intentionally diverge from district leaders' normative behaviors. The human-centered design organization IDEO (2015) emphasizes leaders embedding various positive deviants in design teams to divert from normative solutions through a design process. The superintendent placed together a divergent team in an organizational change structure aligned to his vision, and each team member could then form their own theory of action towards change.

Change Process as an IBL Project

The second finding from this study guides the imagination portion of the framework where a leader's moral purpose specifically leads to a theory of action (Fullan, 2011; Westover, 2020). The original conceptual framework used imagination in the context of planning the transfer of shared vision at a school district. Each participant had their own theory of action, adding to the superintendent's shared accountability model in the district's system. The participants considered their organizational change process as their own IBL experience, and all were co-creators in the process of change. The superintendent continually discussed the conditions and the environments he was creating to advance teacher-led initiatives, how he centered student voices during equity visits, or how he created various opportunities for stakeholders to experience the new pedagogical practices.

In turn, the district leaders became lead learners, interviewed students to help reimagine their learning experiences, and met with parent groups to discuss various co-created district initiatives. Co-creation through discovery practices, student interviews, creating a driving question to frame the problem, and stepping out of the way to allow teams the autonomy to form their own action plans are all part of IBL experiences. I asked the superintendent if he viewed this change process as his own IBL project, and he answered, "Yes." This notion of viewing the change process was also correlated when Participant 2 named that they used a driving question to frame and guide their research and innovations. A driving question is part of the design thinking process (IDEO, 2015), which drives innovation. When asked about challenges, participants viewed them as opportunities to grow. When asked about decisions they would have changed, all said that they would have made the same decisions.

Mehta and Fine (2019) found that core high school classes did not have as many IBL experiences as elective classes. One of their recommendations was to allow the elective teachers to move into core classes because they understand how to teach concepts for deeper learning. After analyzing the district team from Innovation USD, a Fourth Industrial superintendent should place in their plan room for divergent thinkers and work in tandem with their boards accordingly. Along with the aligned but divergent thinkers should be educators who can lead teachers to help scale programs and guide other teachers toward the vision.

Culture of Continual Learning

The third finding from this study guides the production portion of the framework. The original conceptual framework used production in the context of building teacher capacity toward IBL practices for equity. Establishing an organizational learning culture is key to producing the ideation needed for change. The superintendent's theory of action emphasized the shared accountability component through having teacher initiatives raised to the district. The district set the mission and asked school sites to create implementation plans. All plans began with action research, qualitative research, and book studies. All educators began to identify various educational problems of practices at their school sites, prompting ideation toward finding frameworks and evidence-based solutions. These solutions were placed in the school SPSA plan. The district funded Professional development and coaching, and evidence of impact was monitored through frequent equity visits and a quarterly review of the SPSA. The outcome was analyzed and adjusted if needed.

By creating such a robust learning organizational structure, all district leaders became co-creators in the system of change. The district views this as shared accountability, but it lends itself to more of a collective psychological ownership model (Martinaityte et al., 2020).

According to Martinaityte et al. (2020), individual ownership varies from collective ownership of an initiative, as some individuals lose attachment to ownership when an innovation becomes too large. All participants seemed to have individual ownership over their respective theory of action evidenced by either innovating further or mirroring the processes created by the superintendent. A couple of the participants mentioned how they knew vision had transferred throughout the organization because teachers are currently asking for guidance through difficult initiatives they would like to implement at their respective sites. The teachers are leading their own initiatives and simply asking for guidance on presenting the new initiatives to their communities. This can be considered evidence of a collective psychological ownership at the school level.

Relationships

The fourth finding from this study guides the employment section of the framework. The original conceptual framework used employment in the context of how a district gathers resources to implement IBL pedagogical practices. Through qualitative interviews, the superintendent and several district leaders discussed the importance of internal and external partnerships for financial gain through community bond measures, access to industry learning experiences, and community contributions to measure the impact on student learning. A *sell, don't tell* protocol is in place with various participants. The superintendent sent various community members to view schools and programs that implement IBL practices with fidelity to gain shared agreement on what type of experiential learning to expect from the district. Staying with a design thinking mindset, one participant would prototype future facilities and partner with principals and teachers to guide stakeholders through new facility designs. These instances helped create a tangible transfer of shared vision, making ambiguous plans more digestible.

Coinciding with creating a learning organization is a process of resourcing teacher-led initiatives expecting an impact on student learning.

Adjustments Through Reflective Cycles

The fifth finding from this study guides the experience section of the framework. The continual cycle of amplifying and empowering students' voices seems as if they are at the end of the cycle, but they are leading the cycle because the original equity report was prompted by how students and families were experiencing education. Each participant began their planning with qualitative information from students. The parental affinity groups were created to have a continual feedback loop with historically marginalized families to understand how they are experiencing new initiatives. Teachers continually meet in teams and PLCs to critically reflect on various problems of practice, culminating in an SPSA that is reviewed once a quarter so adjustments can be made immediately. The cycle of reflection through the SPSA plans, equity check-ins by district leaders, and continual support systems embedded throughout the system allow for the superintendent's vision to be transferred and iterated throughout the district.

Limitations

Limitations of study findings reside in generalizability and validity. The results are not generalizable due to focusing on one school district and its contextual measures. The focus on district-level leadership threatens validity. Interviewing students and parents would have provided an understanding of the true impact of end-user experience. This study is a case study of one school district that situated interviews and researched district-level processes for pedagogical change. It is important to understand the primary context that this district is situated in an affluent community, which impacts the ability to raise funds and secure additional resources as the district moves toward IBL teaching practices.

Another limitation of this study is that it focused solely on the transfer of shared vision from only one level in the district, from the superintendent to district-level leaders. The continual exchange between shared vision and how the vision was experienced and implemented at the school-site level might have influenced this study's findings. Lastly, the final impact of the organizational change was not examined by interviewing various students, families, and caretakers. Additional interviews would have added information on how the intended end-users experience the change in processes from primary accounts. The perception of experience is addressed in this study based on district equity audits and SPSA plans posted directly on the Innovation USD website due to the transparency negotiated in the district's plans to make sure that the community is continually updated.

Implications for Practice

This study examined the transfer of shared vision in one school district. Study findings established themes that inform district leaders on implementing second-order change toward IBL practices at a school district through the transfer of shared vision. The study resulted in thematic findings mounting towards implications for leadership practices and processes.

The first implication for practice by organizational change leaders to consider when having a strong moral purpose resulting in a vision towards instructional change at a school district is to have a well-thought-out theory of action that includes a model for collaboration by all stakeholders. Study findings suggest that the superintendent had a theory of action, and all district leaders also had their own theory of action supporting the vision.

The second implication for practice by organizational change leaders as it pertains to changing pedagogy towards IBL practices addresses the importance of who is in leadership, supporting change, and the support systems to spread the shared vision. Most interviewees did

not have any intention of working as educators but, through lived experiences, pursued a career in education. Participant 3 did not want to be a teacher or an administrator, yet they are now scaling innovative practices and programs in a district-wide role. Furthermore, Participant 4 wanted to be a teacher all of their life, has won many awards for teaching, and has a strong moral purpose for change in the district, but leans on familiar levers for education, such as professional development and scheduling. Study findings emphasized how individuals with strong moral purposes, underlying lived experience, and previous experience outside of education were more prone to iterate in their specific positions and used the shared vision to innovate, expanding on the possibilities larger than a status quo expectation toward change. The study addresses the importance of creating and maintaining a condition to receive authentic teacher input to inform leadership practices. Leaders might appoint, promote, and advance people in and outside the district who are innovative, creative, and have experienced life outside the education system. Leaders who are promoted from teaching will also need liaison support to help guide administrative and legal aspects of the work.

The third implication for practice highlights the importance of creating a strong learning organization. Participants discussed the various ways shared learning is implemented throughout the district. Professional learning communities supported by site leaders and district leaders allow the organization to innovate initiatives directly from educators facilitating a continual process of shared understanding, shared accountability, and shared accountability. Furthermore, findings from the district and school site websites highlighted fluid plans that are continually reflected upon at each school and supported by district staff four times throughout the year, along with regular district equity check-ins with students. The continual growth in shared learning removes barriers in pedagogy. Consulting firms support professional development, and continual

job-embedded coaching, observations, and student discussions support shared training and accountability for learning implementation.

Future Research

This study's literature review suggests the need for further study on the transfer of shared vision (Kantabutra, 2010; Liou & Daly, 2019), the need for further research on technological history to racialize studies that pertain to technology as it impacts on various marginalized groups in the United States (de la Peña, 2010), and more research on how IBL practices impact students of color at the elementary school level (Duke et al., 2021). This research specifically focused on how Innovation USD is shifting pedagogical practices to have an impact on all student development.

The first recommendation for future research is to provide more case studies of districts that are moving toward IBL practices to correlate and strengthen the findings in this study. This study only features one school district. Although many districts are focused on technology integration, the research identifies that the integration of technology is merely enhanced by the teacher using correct teaching strategies (Hattie, 2012; van Deursen & van Dijk, 2019). It is imperative to focus on changing pedagogy toward IBL practices and the impact on populations of color and teacher morale under the principal's direct influence. The instrument used in this study measured teacher morale broadly, including assessing factors that could be considered extraneous to principal influence. Study findings revealed leadership practices identified by teachers and principals that appear to positively impact teacher morale during principal succession and throughout a principal's tenure. It would be beneficial for future research to further investigate the correlation of specific principal leadership practices with teacher morale within a principal's realm of control.

The second recommendation for future research is to strengthen the generalizability of this study's findings. While generalizability was not a primary focus of the research, investigating additional contexts would strengthen the applicability of implications for practice. This study's strength resided in triangulating data across three contexts of principal leadership, and practitioners could benefit from a more in-depth analysis of specific contexts through a case study. Involving school site leaders, teachers, students, and families would allow for more insights into how the superintendent's shared vision affects the intended end-user. The broader applicability of the additional information could help the district add to its current reflective practices and help pivot school SPSA's.

The final recommendation for future research is to further investigate the other dimensions of the conceptual framework produced in this study by moving away from the imagination portion to the production and employment portion of the framework. Due to the primary focus on how imagination impacted planning toward IBL pedagogy, other studies might focus on teaching capacity through the evaluation of curriculum, learning methods, and professional development to produce behavior change in the classroom. Additionally, employment and implementation of the plan may also be examined in detail. The employment portion of the framework would need to focus more on resource development to fund the plan implementation as well as how end-user voices mold and change the resources needed. Investigating the other areas of the conceptual framework inspired by Sinclair's (1998) observation of how technology impacts communities of color would help to expand the body of technological historical research by framing historically marginalized groups in the research itself.

Conclusions

This study confirmed that education organizations understand the need for a change in pedagogical processes to help prepare students for the fourth industrial workforce. Overall, IBL pedagogical practices are imperative to giving students access to the next industrial-age workforce (Darling-Hammond et al., 2014; Dintersmith, 2018; van Laar et al., 2020; Wagner, 2008). Literature suggests that proper IBL pedagogical practices should be present within school systems to boost the effectiveness of technology implementation (Ayer et al., 2020; Hattie, 2012; Hussin, 2018; Koul & Nayer, 2021). This study used the writings of technological historians to assist in framing how new technologies, even acknowledging new processes as new technology, impact communities of color (de la Peña, 2010; Sinclair, 1998; Trotter, 2000). All participants discussed the need for students to have real-world experiences and how the institutional progress of modern schools moves away from factorization toward personalization of learning experiences. The underlying factor for this need to change is not to close an achievement gap caused by standardization but to allow students from historically marginalized communities the opportunity to experience real-world learning experiences where they can contribute to the world as the problem solvers they inherently are.

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