Empowerment by Design: Classroom Innovation and Inquiry Through Design Thinking and Action Research

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EMPOWERMENT BY DESIGN: CLASSROOM INNOVATION AND INQUIRY THROUGH DESIGN THINKING AND ACTION RESEARCH

By

Cory Rayala

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By

Cory Rayala
DEDICATION

This dissertation is dedicated to my parents, Carol Ruxton and Martin Rayala, for being with me every step of the journey.
ACKNOWLEDGEMENTS

I wish to express my warm and sincere gratitude to the UOP family that supported me on my dissertation journey. This includes the Benerd College faculty and the members of Cohort 4, and especially my committee members, and design thinking gurus, Dr. Brett D. Taylor, Dr. Fred Estes, and Dr. Rod P. Githens.

I could not have accomplished the journey without the love and support of my family and friends. A million thank-yous to my wife Reyna Grande and my children Nathan and Eva; to my sister Morgan McLean, brother-in-law Dr. Daniel T. Kirsch, and my niece Myrtille; to Dr. Andrew McLean, Kay Gregor, John MacPhail, and Dr. Carolyn Zachry; and to my parents Carol Ruxton and Dr. Martin Rayala.

Lastly, I wish to express my tremendous thanks and admiration for my co-participants in this action research study. Your insights and generosity continue to astound me. I look forward to working with you to build upon what we have begun.
Abstract

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2022

Increasingly standardized and assessment-driven educational systems are failing to meet the needs of many students, replacing their love of learning with a fear of failure. Importantly, the fear of failure is a common mindset of not only students but also teachers, administrators, and policymakers. This qualitative, action research study is situated in a design thinking/growth mindset conceptual theory that posits that the design thinking process can serve as a meaningful growth mindset opportunity for teachers and students. The prototyping mindset inherent in design thinking may mitigate the fear of failure by focusing on rapid iteration rather than striving for perfection.

The purpose of this action research study was to use the design thinking process to collaborate with a team of eight educators to build a virtual community of practice that supports innovation and inquiry. The research questions that guided the study focused on (1) obstacles to innovation in education, (2) strategies to overcome the obstacles, and (3) any perceived shift in mindset that occurred in participants throughout the study.

Conducted over four months in the winter/spring of 2021, the study used a design thinking/action research methodology that moved through four phases of Question, Imagine, Make, and Share. The findings revealed the primary obstacle to innovation to be an oppressive system characterized by its tradition of white supremacy and its resistance to change. Further
obstacles included inadequate teacher training, outdated instructional models, overly standardized instruction and assessment, and a lack of resources. Strategies to overcome the obstacles focused on the protective nature of a community of practice, especially when sharing the goal of empowerment by design and supporting the development of the mindsets of action, growth, and inquiry. Participants perceived mindset shifts in either themselves or their students in the areas of growth, awareness, and empathy.

The study contributes to the literature by exploring the practical applications of growth mindset and design thinking within the context of a supportive community of practice. As action research, it gave participants the tools and courage to become empowered research practitioners.
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CHAPTER 1: INTRODUCTION

“We cannot study and understand the human being just through statistics. You can’t leave the job to the governments or the political scientists alone. You have to do it yourself. If you arrive at an understanding of the fears and hopes of [others], then you can understand your own fears and hopes. Only penetrating into reality can save us. Fear cannot save us.”
– Thích Nhất Hạnh, The Heart of Understanding

Setting the Stage for Inquiry

With over 72 million views, the late Sir Ken Robinson’s “Do schools kill creativity?” is the most-watched TED talk ever. If its massive popularity is any indication, there is widespread concern that decades of top-down school reform in the United States have failed. Much has been written on how traditional education systems have become excessively standardized and assessment-driven and, as a result, are failing to meet the needs of many students (Dintersmith, 2018; Goldstein, 2015; Ravitch, 2013; Robinson & Aronica, 2015; Wagner, 2012). Faced with systems that actively discourage innovation, teachers, students, parents, and administrators all over the world are clamoring for a more student-centered education (Dintersmith, 2018; Wagner & Dintersmith, 2015).

The struggle is not a 21st-century phenomenon. Even at the dawn of the last century, progressive educators such as John Dewey were advocating for an individualized and experiential approach to learning (Mondale & Patton, 2001). The difference now is that technology has brought us closer together. Like other recent social movements that have flourished in the more interconnected world created by social media, the push to transform education has gone mainstream. A broad consensus now exists that the traditional educational
model has hit its breaking point and that fundamental change is necessary (Dintersmith, 2018; Merrow, 2017; Ravitch, 2013; Robinson & Aronica, 2015; Wagner, 2012).

In his talk, Robinson argues that creativity is as essential as literacy and that, by making students afraid to be wrong, we are educating them out of their creative capacities (Robinson, 2006). Indeed, studies show that learners are intrinsically motivated by feeling in control of their education (Harris & de Bruin, 2017; Lamb, 2011). However, student motivation suffers when their autonomy is thwarted by an educational system focused on high-stakes standardized tests and one-size-fits-all instruction. Natural curiosity is replaced by a fear of failure, which inhibits learner engagement and renders students uninterested in making a difference in the world (Harris & de Bruin, 2017).

Promising studies show that students’ beliefs regarding their abilities can influence their motivation and, therefore, empowering students to reshape their mindset can positively impact their motivation and achievement (Lin-Siegler et al., 2016; Rattan et al., 2015; Stock et al., 2018). The work of Stanford psychologist Carol Dweck (2006) on the growth mindset suggests that when students are encouraged to develop their skills and learn from their mistakes, they cultivate an understanding that intelligence and abilities are not fixed traits. Students employing a growth mindset invite challenges and persist in the face of obstacles (Yeager et al., 2016).

**A Problem of Practice**

Importantly, the fear of failure is a common mindset of not only students but also teachers, administrators, and policymakers (Harris & de Bruin, 2017). Dweck (2006) emphasizes that when it comes to conveying mindsets to students, the actions of adults speak louder than their words. When learners feel they are being measured and judged, they are more likely to exhibit fixed mindset traits (Dweck, 2006). Likewise, when educators feel they are being measured and judged, such as by basing the quality of their teaching on the standardized
test scores of their students, they are more likely to feel demoralized and less likely to pursue innovative educational practices (Robinson & Aronica, 2015; Wronowski, 2020). Instead of feeling supported, educators feel undermined by a system seemingly designed to discourage innovation.

The fear of failure and its consequences have caused educators to be overcautious when it comes to innovating in the classroom (Kelley & Kelley, 2013). The perceived lack of agency that results from working within a fear-based and compliance-driven system prevents teachers from taking risks and thereby perpetuates an ineffective and often inequitable status quo. The lack of agency permeates the entire system; administrators believe that the power to effect change rests with teachers while teachers feel powerless to act (Hess, 2015; Thompson, 2018).

When innovation in the field of education occurs, it often does so in isolation. Pockets of innovation and limited networks of progressive educators have proven successful, especially when they allow teachers to be part of a community of practice working collaboratively to further instructional capacity (Fullan & Gallagher, 2020). However, the successes are coming mainly from disconnected islands of innovation. Many educators who would like to try more creative approaches in the classroom are met with resistance from administrators and other teachers. Facilitating the establishment of communities of practice that support innovation and inquiry, either in-person or virtually, may be vital to empowering educators who feel oppressed by an educational system (Wenger-Trayner & Wenger-Trayner, 2019).

Despite the obstacles, educators are harnessing the power of new technologies that connect changemakers and facilitate collaboration to build a more student-centered educational system (Dintersmith, 2018). Sometimes called deeper learning strategies, emerging innovative educational approaches include project-based learning, STEAM education, and design thinking. Most notably, a growing movement of design thinking researchers and practitioners sees its
potential to transform education (Cook & Bush, 2018; Goldman & Kabayadondo, 2016; Harris & de Bruin, 2017; Kijima et al., 2021).

While several definitions of design thinking exist, most design thinking practitioners agree that it is a process and mindset for applying creativity to solve complex problems and make the world a better place (Carroll, 2014; Spegman, 2018). Learning to embrace failure as an expected step toward success is a major theme in design thinking, and the prototyping mindset inherent in design thinking may mitigate the fear of failure by focusing on rapid iteration rather than striving for perfection (Carroll, 2015; Carroll et al., 2010; Kwek, 2017; Zielenski, 2017). Instead of being afraid of failure, teachers and students can be emboldened by a mindset of failing forward, meaning that by taking risks, we permit ourselves to use our setbacks as opportunities for growth (Zielenski, 2017). By cultivating a bias toward action in which we embrace the power of prototyping and iteration, design thinking can empower us to make a difference in an increasingly dynamic world (Carroll, 2014).

**Purpose Statement**

The purpose of this action research study was to use a design thinking process to collaborate with a team of eight educators to build a virtual community of practice that supports innovation and inquiry. The participants and I used design thinking and action research as vehicles for meaningful change as we developed strategies to help educators become empowered research practitioners.

**Research Questions**

The research questions that guided the study are:

1) What obstacles to innovation in education, if any, do educators perceive to be most prominent?

2) What strategies empower educators to create innovative educational solutions?
In what ways, if any, do educators describe changes in their mindset when they engage in design thinking?

Significance

Researchers have identified at least 35 different models of the design thinking process (Waidelich et al., 2018). While future research comparing the descriptions of each phase of these and other models, as well as the specific methods identified within each phase, may yield a more unified and cohesive understanding of the design thinking process, such an undertaking was beyond the scope of this study. Instead, by using design thinking in working with educators and education innovators to co-create strategies for building a community that supports inquiry and innovation, this study aimed to contribute to the understanding of the intersection of the burgeoning theories of growth mindset and design thinking.

Growth mindset and design thinking both have strong proponents. They also both have their detractors. While this study will likely not change the minds of either side, it contributes to the literature by exploring the practical applications of growth mindset and design thinking. Researchers and practitioners seeking methods of teaching the growth mindset to students may find the exploration of mindset activities informative. Researchers interested in applying design thinking to education may find the distillation of the steps of the design thinking process useful. Researchers interested in how growth mindset theory and design thinking theory inform each other may find the exploration of the relationship between the two promising.

From a policy perspective, the findings and innovations related to both design thinking and growth mindset may help encourage the adoption of such practices in K12 and post-secondary settings. Furthermore, the technological strategies employed to conduct the action research may serve as models of collaboration for an increasingly hybrid work and school environment. While face-to-face interactions will always be the gold standard of human
communication, virtual interactions have their benefits, too. Whether through video conferencing, online collaboration tools, social media messaging, or virtual and augmented reality, the ability to collaborate remotely can be more convenient, inclusive, and cost-effective than meeting in person. As we have learned, it has the added benefit of being safer during a pandemic.

Arguably of most significance, this study sought to positively influence the classroom experience of teachers and students. Since the fear of failure affects us all at times, the study conjectured that the action of design thinking and the power of community might give us the courage and support to embrace innovation in the classroom. As action research, this study encouraged the participants and me to believe in our powers of agency, self-efficacy, and growth. Most critically, it gave us the tools to become empowered research practitioners. In his book *Creative Schools*, Ken Robinson (2015) concluded that when the education revolution comes, it will come from the ground up. If we are to transform education, it will need to begin in the classroom. I hope this study contributes to a growing groundswell of teachers and education leaders who recognize their power to shape the system.

**Conceptual Framework**

The conceptual framework of the study centers on the interplay of the emerging theories of growth mindset and design thinking. Mindset theory developed from the work of Stanford psychologist Carol Dweck beginning in the 1970s. Mindset theory posits that we all have the capacity for either a fixed mindset, in which we believe that our abilities are static, or a growth mindset, in which we believe that our abilities can be developed. If we can nurture the growth mindset, we can better face challenges, learn from our failures, and believe in our ability to shape our future (Dweck, 2006).
The term design thinking was first used in the late 1950s and 1960s to describe industrial design processes. It was then applied more generally to the business sector. Its application to education is still in the early stages of inquiry, but studies have found that design thinking creates an interdisciplinary space where students can learn in relevant and meaningful ways (Cook & Bush, 2018; Goldman & Kabayadondo, 2016; Henriksen et al., 2017; Johns & Mentzer, 2016). Since design thinking is considered both a process and mindset and since the design thinking mindset of failing forward through iteration encourages the belief that one’s abilities can be developed, the design thinking process may serve as a meaningful growth mindset activity that gives teachers the courage to innovate.

In so far as this study seeks to encourage systems change, it is aligned with the philosophical paradigm of pragmatism often associated with the works of C.S. Peirce and John Dewey. Pragmatism’s emphasis on outcomes and effects over principles and assumptions, its affinity for design-based and action research, and its close association with the scientific method make it a natural fit for those interested in design thinking (Noddings, 2016). While pragmatism fell out of favor somewhat with the advent of constructivism and critical theory, the worldviews are not incongruent (Noddings, 2005). Ontologically speaking, constructivism assumes multiple realities, while pragmatism sees a single truth that, given an infinite number of years of careful inquiry, might be approached, if not achieved (Phillips, 2005). In fact, Dewey found the terms “truth” and “knowledge” to be altogether problematic and preferred the more pragmatic “warranted assertibility” (Noddings, 2005). On a practical level, the pragmatic emphasis on problem-solving, discovery, and change is well-suited to action research.

A pragmatic view is not inconsistent with the critical theory contention that knowledge is socially constructed. There is room within pragmatism and design thinking for addressing the influence of power relations in our social constructs. Leaning into the concept of liberatory
design thinking, we can ensure that, when we observe the world, we also notice how our experiences shape our perceptions and how our inherent biases may perpetuate an inequitable status quo (Anaissie et al., 2017). When we bring our designs to the world, we can remember that we are a part of the world we hope to change. In changing the world, we have the opportunity to change ourselves. It is no wonder that pragmatism is experiencing something of a renaissance in philosophical discourse. I further explore the conceptual framework for the study in Chapter 2.

**Delimitations**

The action research was conducted in the winter and spring of 2021. I worked with a group of eight educators and education innovators from around the world as co-participants in the action research. The data collection occurred in four stages that followed our four phases of the design thinking process—Question, Imagine, Make, and Share—with each phase spanning approximately one month.

Since I intend for the social business to emerge from this work to have a global reach, it was important that the study participants were from disparate locations from around the country or world. As such, it was necessary to situate the inquiry in a virtual environment. The use of emerging collaborative technology maximized the benefit to participants while minimizing the impact on their time. With this in mind, to select study participants, I used purposeful, criterion-based sampling that considered not only the participants’ expertise, creativity, and enthusiasm but also their access to and facility with collaborative technologies. Though the study design was conceived pre-pandemic, it was especially well adapted for the remote collaboration necessitated by COVID-19. I will further discuss the use of technology to help us support each other throughout the inquiry in Chapter 3.
Chapter Summary

Increasingly standardized and assessment-driven educational systems are failing to meet the needs of many students. When students lose their sense of agency, their love of learning is diminished and replaced with a fear of failure (Harris & de Bruin, 2017). Of course, a fear of failure is also experienced by teachers, administrators, and policymakers (Harris & de Bruin, 2017). The prototyping mindset inherent in design thinking may mitigate the fear of failure by focusing on rapid iteration rather than striving for perfection (Carroll et al., 2010). This qualitative, action research study is situated in a design thinking/growth mindset conceptual theory that asserts that the design thinking process can serve as a meaningful growth mindset opportunity for teachers and students. Specifically, the study seeks to use design thinking to collaborate with a team of educators to co-create strategies for building a community of practice that supports teacher innovation. The next chapter reviews the literature focused on fear as an impediment to innovation in education, current innovative educational approaches, and the conceptual framework of design thinking and the growth mindset.
CHAPTER 2: LITERATURE REVIEW

From Fear to Action

In the following review of the literature, I will explore the role of fear as an impediment to innovation and a significant root of the perceived problems facing education today. First, I will convey a brief history of how fear has shaped education policy in the United States. Next, I will examine how current innovative educational approaches, including virtual communities of practice, provide a potential roadmap for overcoming the barrier of fear. Finally, I will review the literature supporting this study’s conceptual framework that posits that a design thinking strategy might shift our mindsets away from fear and inaction and toward empowerment and growth.

The Role of Fear in U.S. Education

The roots of the current state of U.S. education go back over a century to the very establishment of public education in the country. Inherent in the worldview that shaped education in the 19th century was the fear that the children of immigrants were not adequately assimilating into American society (Mondale & Patton, 2001). Education historians suggest that the development of public education in the United States was heavily influenced by the fear that immigrant populations were holding on to the languages and customs of their countries of origin and not fully integrating into the English-speaking workforce (Goldstein, 2015; Mondale & Patton, 2001). The perceived need to have workers who would show up on time, adhere to standardized work schedules, and understand instructions given in English was reflected in schooling practices that were believed to foster future generations of compliant farm and factory workers (Dintersmith, 2018).
Compounding the persistent fear of change was the fact that many workers at this time were unpaid and involuntary (Goldstein, 2015). Many farms and factories relied on an enslaved workforce as part of their economic and business model. These workers were not allowed to own property, have a voice in legal and political processes, or be educated like the majority population of students. The U.S. school system of the 1800s was complicit in perpetuating the inequities and discrimination prevalent in the larger society (Kaestle, 2001). Even at the dawn of the 20th century, when the United States was educating more children than any country in the world, many African American and Native American children were still being denied education or receiving it only in segregated settings (Mondale & Patton, 2001). After the 1954 U.S. Supreme Court ruling on Brown v. Board of Education of Topeka, all schools in the United States finally began to be officially integrated, but only in the face of fear and violence, and in the case of the Little Rock Nine, only with the protection of the 101st Airborne (Anderson, 2001).

While segregationist policies have been diminished somewhat over the years by more progressive laws, there remains significant bias in discriminatory practices such as redlining, by which banks, insurance companies, and others refuse or limit loans, mortgages, insurance, and other financial services within specific geographic areas, often inner-city neighborhoods with high minority populations (Martin & Varner, 2017). Indeed, most of the perceived failings of urban schools can be attributed directly to poverty and segregation (Ravitch, 2013). It should come as no surprise then that, while students generally become more disengaged as they move through school, the effect is significantly more pronounced with low-income African American and Latino students in urban school districts (Fredricks et al., 2019). Furthermore, while the history of slavery is foundational to inequities that persist to this day, slavery and its
ramifications have not been adequately taught; therefore, students lack even a basic understanding of its lasting impact (Shuster et al., 2018).

Another fear, that of falling behind the Soviet Union in the arms race, led to the first significant influx of federal money in education; the 1958 National Defense Education Act committed over $100 million a year to fund the new education priorities (Mondale & Patton, 2001). The Soviet Union had just launched Sputnik 1, the first artificial satellite to circle the globe. The space race that ensued was the beginning of a new era of scientific, economic, political, technological, and military developments. While the social and political unrest of the 1960s would refocus the aims of public education, for a brief period, the goal of schooling became to foster innovators proficient in science and math who would create new technologies and keep the country competitive (Hook, 1963; Ravitch, 2001).

Fear has also been the driving force behind the latest surge of education reform from the top-down. The 1983 U.S. Department of Education report, *A Nation at Risk*, so scared policymakers and the public that it kicked off decades of high-stakes testing that we are still contending with today (Mondale & Patton, 2001). Even though the recommendations it laid out were relatively nuanced and measured, and it did not explicitly blame schools or teachers for declining test scores, the report’s provocative tone fueled a fear that the United States was falling behind the rest of the world (Merrow, 2017; Ravitch, 2010).

The fear was reflected in the media coverage at the time. In the three years prior to the release of the report, 80% of newspaper stories on education were positive. In the three years after the report's release, the percentage dropped to 53% (Ginsberg & Lyche, 2008). Politics and fear are inextricably linked, and nothing illustrates the connection between the two in education better than the fact that in the two decades that followed *A Nation at Risk*, whenever the presidency switched political parties, negative stories about education proliferated (Ginsberg &
Lyche, 2008). It will be interesting to see if this trend continues with the 2021 change of administration.

The height of the accountability movement was the federal legislation No Child Left Behind (NCLB) from 2001 and Race to the Top (RTTT) from 2009, which used standardized tests to measure and rank students, schools, and teachers. So terrified were teachers and administrators of the ramifications of low test scores that a rash of cheating scandals broke out, with educators systematically erasing and correcting answers on their students’ tests (Goldstein, 2015; Ravitch, 2013). The lack of teacher support and autonomy prevalent in the accountability era of NCLB and RTTT significantly demoralized public school teachers and led many to change schools or leave the profession altogether (Wronowski, 2020).

From the fear of intemperate male teachers in the 1840s; to the fear of uneducated female teachers in the 1890s; to the fear of unionized teachers in the 1900s; to the fear of black teachers in the 1950s; to the fear of incompetent teachers in the 1980s; to the fear of tenured teachers today, the progress of the U.S. educational system has been framed by a never-ending parade of moral panic focused on teachers (Goldstein, 2015). Education historians point out that if we have learned one thing from history, it is that any failings of education are with the system, not with teachers (Goldstein, 2015; Merrow, 2017). The social, cultural, political, and economic conditions of the 19th and 20th centuries shaped an educational system built on compliance, rote learning, orderliness, bell schedules, and the Agrarian calendar, all of which are hallmarks of education still today (Robinson & Aronica, 2015; Wagner & Dintersmith, 2015). Only recently has it become part of the national agenda to educate citizens who can contribute to the creative, entrepreneurial needs of a world being changed by advanced farming and manufacturing techniques involving robotics, machine learning, and artificial intelligence (Dintersmith, 2018; Robinson & Aronica, 2015; Wagner, 2012).
Fear as a Barrier to Innovation

As described above, the overriding obstacle to meaningful progress in the U.S. educational system has been fear. At the most fundamental level, millions of passionate educators have been stymied by a fear of change wrought by a system designed to suppress innovation (Robinson & Aronica, 2015). Instead of encouraging progressive educational techniques that focus on the student, the accountability era calcified traditional teacher-centered practices (Cuban, 2001). Education has had a tradition of teaching students about the past as if the goal was to catch them up on things that had happened before they were born (Wagner & Dintersmith, 2015). It has only recently become part of the curriculum to prepare learners to solve problems and thrive in an uncertain future that is itself going through exponential changes (Robinson & Aronica, 2015; Wagner, 2012). While much has been written about creativity in education, in actual practice, fear has often caused educators to be overcautious when it comes to innovating in the classroom (Kelley & Kelley, 2013).

Overcoming Fear in Education

Despite the sometimes-overwhelming obstacles in their way, thousands of teachers, students, parents, and administrators, fueled by technology that connects changemakers and facilitates opportunities for meaningful interaction, are clamoring for a more student-centered education (Dintersmith, 2018). The idea that learners need to have more of a say in what and how they learn is not a new concept. Dating back at least to the work of John Dewey at the cusp of the 20th century, progressive educators have striven to move past traditional models of schooling toward a more individualized and experiential approach. Indeed, John Dewey was advocating for greater student agency 80 years ago when he wrote in *Experience and Education*, “there is no defect in traditional education greater than its failure to secure the active cooperation of the pupil in construction of the purposes involved in his studying” (p. 67).
While a progressive mindset needs to become the norm, not the exception, to transform the U.S. educational system to meet the needs of the 21st century, notably, some students report that their teachers treat them professionally and let them make decisions that affect the way they learn (Taylor, 2019). Recent innovative educational approaches, sometimes grouped under the umbrella term of deeper learning, include project-based learning, problem-based learning, interest-based learning, STEAM education, and design thinking education. An October 2019 report published by the Learning Policy Institute acknowledged that, while many such approaches have been successful, scaling them for widespread adoption has proven difficult (Hernández et al., 2019). The report highlighted three networks of deeper learning schools that have demonstrated particular success in creating communities of educators dedicated to transforming education. The networks provide a valuable sample of the current landscape of education innovation.

The Big Picture Learning Network, founded in 1996 by Dennis Littky and Elliot Washor, grew from a single school in Rhode Island to a network of over 60 schools in the United States and 100 internationally. The network emphasizes interest-based learning, which, as the name suggests, ascribes to the Deweyan ideal of basing instruction on the interests of learners and thereby engaging with their natural strengths and abilities. Driven mainly by district leaders looking for alternatives for students whom traditional schools have failed, the Big Picture Learning Network has grown to serve around 26,000 students across the globe (Hernández et al., 2019).

The Internationals Network for Public Schools also began with a single school, this one in Queens, New York, in 1985. The mission of Internationals continues to be to serve the diverse needs of recent immigrants and English language learners. Given their mission, wraparound student services are a high priority. The network also promotes project-based
learning and uses interdisciplinary teams of students and teachers to personalize instruction. As
the name implies, all of the 27 schools are public. Most of the schools are in New York City, but
Internationals schools can be found in six states and the District of Columbia. Notable West
Coast schools include San Francisco International High School and Oakland International High
School. Nationwide, the Internationals Network for Public Schools serves 9000 students
(Hernández et al., 2019).

New Tech Network began in California at the Napa Valley Unified School District in
1996. A non-profit that has evolved to meet the needs of the schools it supports, New Tech has
also remained true to its school design focus of technology-infused, project-based learning. The
network has a strong emphasis on building positive cultures. Students and teachers are
encouraged to take risks that they might avoid in more conventional school settings. Ninety
percent of the 207 schools in New Tech Network are in public school districts. The schools can
be found in 25 states and Australia, serving over 80,000 students (Hernández et al., 2019).
Incidentally, my daughter attends a school in the New Tech Network in Northern California, and
it has been informative hearing her first-hand experiences with project-based learning.

A key tenet of each of these deeper learning approaches is interdisciplinarity—a
combination of two or more academic disciplines. Interdisciplinarity creates a space where
students can learn in meaningful ways that connect to their interests in science, technology,
engineering, arts, and math—five disciplines that proponents for integrating art and design into
other subjects term STEAM education (Cook & Bush, 2018; Johns & Mentzer, 2016). In
defining STEAM, researchers stress that it is not a model where instruction is necessarily
presented through the lens of the arts. Nor is it an effort to incorporate every discipline into
every lesson (Cook & Bush, 2018; Harris & de Bruin, 2017; Watson, 2015). Instead, STEAM is
an instructional approach that treats all disciplines as co-equal, makes authentic connections
between subjects where appropriate, and employs a team model to encourage a flexible and relevant exploration of a central theme (Watson, 2015).

Project-based learning, interest-based learning, STEAM education, design thinking, and other deeper learning approaches are collaborative, interdisciplinary, and inquiry-based. Their advocates see them as transformative 21st-century learning approaches that use integrative, holistic methods to prepare students for an innovation-based economy and a lifetime of inquiry (Cook & Bush, 2018; Harris & de Bruin, 2017; Watson, 2015). Despite promising early studies, further research is required to make clear where deeper learning approaches intersect, where they diverge, and how they can work to support each other (Spegman, 2018; Watson, 2015).

**Communities of Practice**

Another common feature of innovative learning networks such as those described above is that the teachers in the networks are well-supported within communities of practice (CoPs). The concept of the community of practice emerged in the early 1990s in the work of Lave and Wenger. It was initially conceived as a group of learners that, by virtue of their shared identity, competencies, and commitment to improving practice, had over time established a “distinct and enduring social structure” (Wenger-Trayner & Wenger-Trayner, 2020, p. 32). As the term has gained popularity, the concept has been watered down and is now sometimes used to describe any interaction in which participants engage in shared learning. Etienne and Beverly Wenger-Trayner give the humorous example of a conference that attempted to hold a community of practice for attendees on a single day between 4:00 and 5:00 pm (Wenger-Trayner & Wenger-Trayner, 2020).

In their recent work, the Wenger-Trayners are reclaiming the original meaning of communities of practice by introducing a new term, social learning spaces, to cover the broader concept of learners engaged in an endeavor whose intent is to make a difference in the world
Whether the concept of social learning spaces will catch on as a theoretical framework remains to be seen. However, it is clear that the learning communities established by schools in the innovative networks described above fit the original, more restrictive definition of communities of practice, and it is this type of community that I am striving to create through this action research.

**Virtual communities of practice.** If one accepts the premise that teachers require a supportive community of practice to sustain innovative strategies in the classroom, the question remains, what about teachers who are working within a system that is unsupportive of or even hostile to innovation? How can these teachers find learning partners who share a common commitment to improving practice? The answer may lie in the recent emergence of virtual communities of practice (VCoPs). As the name implies, VCoPs maintain the requisite characteristics of CoPs while adding an online component. Early examples of VCoPs relied on email, social messaging platforms, wikis, and online collaboration tools such as Google Docs to facilitate community. More recent VCoPs have taken advantage of video conferencing and virtual reality to allow members to simulate face-to-face interactions. While further research is needed to determine if VCoPs can be as effective at engaging participants as traditional CoPs, early data suggests that interdisciplinary collaboration is facilitated when VCoP members can interact from a safe and convenient space such as their home or office (Yang et al., 2020).

**Conceptual Framework**

The work of Stanford psychologist Carol Dweck (2006) on the growth mindset suggests that when students are encouraged to continuously develop their skills and learn from their mistakes, they cultivate an understanding that intelligence and abilities are not fixed traits. Students employing a growth mindset invite challenges and persist in the face of obstacles (Yeager et al., 2016). Another Stanford professor, Bernard Roth, has suggested that design
thinking has “the power to flip students’ mindsets” (2017, p. xvii). Indeed, learning to embrace failure as an expected step toward success is a major theme in design thinking (Carroll, 2015; Kwek, 2017; Zielezinski, 2016). The conceptual framework guiding this study suggests that since the design thinking mindset of failing-forward through iteration encourages the belief that one’s abilities can be developed, by demonstrating that failure is a natural step on the road to progress, the design thinking process can give educators the courage to innovate.

Judging from the Google Ngram Viewer, which graphs the frequency of words appearing over time in the Google Books Corpus, the terms growth mindset and design thinking are experiencing exponential and seemingly aligned growth in popularity (see Figure 1). If the growth is an indication of the interest in these emerging theories, and if the trend continues, we may be seeing an explosion of related studies. In the next sections, I will explore the theories of growth mindset and design thinking and the intersection of the two.
Growth mindset. Growth mindset theory developed from the work of Carol Dweck beginning in the 1970s. Growth mindset theory posits that we all have the capacity for either a fixed mindset, in which we believe that our abilities are static, or a growth mindset, in which we believe that our abilities can be developed. If we can nurture the growth mindset, we can better face challenges, learn from our failures, and believe in our ability to shape our future (Dweck, 2006). While already influential in the academic world of psychology during the last decades of the 20th century, Dweck’s work gained exponentially greater popularity with the 2006 publication of her book, Mindset: The New Psychology of Success. The book modeled its marketing after other bestselling, one-word titled works of popular psychology/self-help such as Malcolm Gladwell’s Blink: The Power of Thinking Without Thinking from the previous year or
Mihaly Csikszentmihalyi’s *Flow: The Psychology of Optimal Experience* from the previous decade. With over two million copies in print, *Mindset* has become such a staple in education today that even my sixth-grade daughter knew of the concept when I asked her.

Thanks in large part to the success of her book, Dweck’s work has gained a dedicated following. Dweck and her academic acolytes formed the Mindset Scholars Network, consisting of 43 researchers from across the country. According to its website, the network “conducts original interdisciplinary research, builds capacity for high-quality mindset scholarship, and disseminates the latest scientific knowledge through outreach to education stakeholders” (2020). The website includes links to Mindset research, resources and initiatives, and a blog written by network members. Dweck is not the only best-selling member of Mindset Scholars Network. Ten years after Dweck’s successful book launch, Angela Duckworth released her own best-selling, one-word titled work of popular psychology, *Grit: The Power of Passion and Perseverance*.

The popularity of Dweck’s ideas also means that they are more susceptible to misinterpretation or refutation. Dweck addressed her critics directly in a 2015 article, saying that prior to the publication of her famous book, she felt as though she was working in secret by publishing only in academic journals. While she relished being able to share her discoveries with so many teachers, she felt that her book's success led to misunderstandings that she sought to clear up in the article. Dweck states that having a growth mindset was never meant to be equated with merely making an effort. She fears that by focusing on a message of trying one’s best, educators may be using mindset theory to mask achievement gaps instead of closing them. She also fears the emergence of false growth mindsets where teachers and parents claim to have a growth mindset but unknowingly promote a fixed mindset through their words and actions. Dweck claims some responsibility for these misunderstandings, saying that she and her
colleagues may have placed too much emphasis on student effort in their early writings. She also regrets implying that people have either a growth mindset or a fixed one, when in fact, we almost always have a mix of the two (Dweck, 2015).

Additionally, some studies have failed to replicate earlier findings of an association between mindset and student achievement (Bahník & Vranka, 2017; Miller 2019). In an effort to address any concerns, Dweck and 24 co-authors (!) published a 2019 article in Nature outlining the results of the National Study of Learning Mindsets. In addition to validating the connection between mindset and achievement, the study also found that a brief online mindset intervention had a positive effect on the grades of U.S. high school students with lower-than-average achievement (Yeager et al., 2019). Interestingly, the study found that for the impact to be sustained, the students needed to be in a school environment where their peers also took on intellectual challenges with a growth mindset.

The situation is problematized by the fact that most mindset studies have found a clear association between low socioeconomic status (SES) and low growth mindset levels. The studies highlight a cycle in which systemic economic inequality begets psychological inequality, which in turn exacerbates the negative effects of economic inequality on student achievement (Claro et al., 2016). While students from families with low SES are less likely to exhibit a growth mindset, the silver lining is that those who do have a growth mindset demonstrate achievement on par with the fixed mindset students from families with high SES. The findings suggest that possessing a growth mindset may ameliorate the adverse effects of poverty on student achievement (Claro et al., 2016).

A recent quantitative study used a longitudinal dataset of 221,840 California students in grades four through seven, making it the most extensive study of its kind (Claro & Loeb, 2019). With a dataset rich in student demographics such as gender, race, mother’s educational
attainment, English learner status, and free and reduced-price lunch status, the authors were able to analyze the results of social-emotional learning surveys that included questions measuring growth mindset. In keeping with earlier findings, the study found an association between low socioeconomic status and low growth mindset levels. Specifically, students who reported fixed mindsets were more likely to be Latinx and English language learners, to have a parent without a high school diploma, and to be receiving free or reduced-price lunch. The researchers also analyzed the students’ annual test scores in math and English language arts from 2013 to 2017. Using regression analyses, the researchers were able to arrive at the remarkable statistic that the difference between a student having a growth mindset rather than a fixed one is the equivalent of having 35 extra days of instruction per year in math and 48 in English (Claro & Loeb, 2019).

Another study with high school students in Kenya found that those who indicated that they have a growth mindset did better on tests than those with a fixed mindset (Kizilcec & Goldfarb, 2019). Especially pertinent to the current inquiry, researchers noticed that the growth mindset students spent longer answering the questions on the assessment. It should be noted that explicit training in growth mindset yielded a significant increase immediately after the training. When measured again three months after the training, the gains had not continued to rise but instead seemed to have stabilized at the post-training level (Kizilcec & Goldfarb, 2019). The lack of evidence for the long-term effects of growth mindset interventions is a significant gap in the literature (Seaton, 2018).

**The intersection of growth mindset and design thinking.** Further research is needed on the duration and dose effect of mindset interventions and on the learning environments in which growth mindsets thrive. But if a one-hour intervention can have a significant impact on student outcomes, one can imagine the effect a sustained process such as design thinking continually reinforcing the tenets of a growth mindset could have. The role of the teacher or
mentor is also critical to the success of growth mindset interventions. Not surprisingly, students with teachers who emphasize the growth mindset through daily learning strategies show more sustained levels of achievement after mindset interventions (Schmidt et al., 2015; Yeager et al., 2021). Even in an educational setting such as Finland, where the concept of failing forward is an integral aspect of the national pedagogy, teachers with a growth mindset are more apt to challenge their students to address their fear of failure and thereby develop their thinking skills and metacognition (Rissanen, 2019).

Since design thinking is considered both a process and mindset and since the design thinking mindset of failing forward through iteration encourages the belief that one’s abilities can be developed, the design thinking process may serve as a meaningful growth mindset activity that gives teachers the courage to innovate. In the following section, I will review the most recent literature on design thinking. Specifically, I will look at how design thinking is being defined, how it is being integrated into classroom practice, and how researchers are beginning to measure its effects.

**Design thinking.** There is a growing movement of design thinking researchers and practitioners who see its potential to transform education (Cook & Bush, 2018; Goldman & Kabayadondo, 2017; Harris & de Bruin, 2017). With its roots in the educational philosophies of John Dewey and L.S. Vygotsky, design thinking is grounded in the principles of engaging with the world to solve problems and collaborating with others through meaningful interaction (Goldman & Kabayadondo, 2017). While there is not yet a robust body of research, anecdotal successes and some empirical studies suggest design thinking may be the key to finally realizing Dewey’s ideal of integrating theory and practice.

With design thinking gaining buzzword status, researchers have found it helpful to distinguish what it is not (Goldman & Kabayadondo, 2017; Spegman, 2018). Design thinking is
not merely a series of steps to follow. It is not simply the scientific method, though it has been called its creative counterpart. Moreover, it is not something that can be taught in isolation from a guiding theme or problem. While a universally agreed-upon definition of design thinking has yet to emerge, most design thinking practitioners agree that it is a process and mindset for applying creativity to solve complex problems and make the world a better place (Carroll, 2014; Spegman, 2018).

**Models of the design thinking process.** Just as a universal definition of design thinking has not been established, neither have the steps in the design thinking process been universally agreed upon. Indeed, researchers have identified at least 35 different models of the design thinking process (Waidelich et al., 2018). The most widely referenced model comes from the Hasso Plattner Institute of Design at Stanford, often referred to as the d.school. The d.school model of design thinking identifies five steps: Empathize, Define, Ideate, Prototype, Test (Doorley et al., 2018). The design and consulting firm IDEO, with its roots in the d.school, has identified five similar phases of the design process: Discovery, Interpretation, Ideation, Experimentation, Evolution. IDEO also developed a “Design Thinking for Educators Toolkit” (2013), which adapts the design thinking process for K-12 education. A more recent design thinking model adapted for the school setting is the LAUNCH Cycle, which has six phases that form its acronym: Look, Listen, and Learn; Ask Lots of Questions; Understand the Problems or Process; Navigate Ideas; Create; Highlight What’s Working and Failing (Spencer & Juliani, 2016). Google developed another six-phase design thinking methodology and toolkit called the “Design Sprint Kit” (n.d.), whose steps consist of Understand, Define, Sketch, Decide, Prototype, Validate. Future research comparing the descriptions of each phase of these and other models, in addition to the specific methods identified within each phase, may yield a more unified and cohesive understanding of the design thinking process (Waidelich et al., 2018).
Criticism of design thinking. The potential of design thinking to transform business and education has generally been lauded in the literature, some going so far as to call it a panacea (Waidelich et al., 2018). However, design thinking is not without its detractors. Design thinking has been criticized for being a repackaged and overly marketed version of older ideas and for perpetuating an inequitable status quo by relying on the subjective role of empathetic engagement to guide the designer (Ambole, 2020; Iskander, 2018; Kimbell, 2011).

In an effort to address the second concern, the Stanford d.school partnered with the National Equity Project to explore equity-centered or liberatory design. The premise of the initiative is that design work sometimes lacks the intention to address inequities and that equity work sometimes lacks intentional design. However, when the two intersect, design thinking has the potential to mitigate the effects of oppression on education and promote equity. The d.school has created a Liberatory Design Toolkit that encourages designers to add two additional steps to the five-step process described above. Before the “Empathize” step, the toolkit suggests adding a stage where the designers will “Notice” their own identity, including the biases and assumptions they bring to the work. The toolkit also advocates that an additional “Reflect” phase be integrated throughout the design thinking process to allow the designers to recognize the impact that their designs are having, especially on equity issues (Anaissie et al., 2017). Design thinking and equity work are a seemingly natural fit, but there is currently little research on the topic, and so further study is warranted.

Design thinking and the mindset of failing forward. While the design process has been a topic of study for decades, researchers acknowledge that its application to education is still in the early stages of inquiry (Goldman & Kabayadondo, 2017; Henriksen et al., 2017). Initial studies have found that incorporating a human-centered and prototyping mindset into interdisciplinary instruction has enhanced participants’ willingness to learn from their mistakes
and has strengthened the mentoring relationships between teachers and students (Carroll, 2015; Cook & Bush, 2018; Harris & de Bruin, 2017; Kijima et al., 2021).

Learning to embrace failure as an expected step toward success is another common theme in the literature on design thinking education (Carroll, 2015; Kwek, 2017; Zielezinski, 2017). Psychologist Madeline Levine (2012) has postulated that as primary grade students approach middle school, their fear of failure outpaces their excitement about school. Learning ceases to be fun precisely when students begin comparing themselves to their peers and when they begin to feel the pressure of standardized tests. Studies suggest that the prototyping mindset inherent in design thinking can mitigate the fear of failure by focusing on rapid iteration rather than striving for perfection (Carroll et al., 2010). Instead of being afraid of failure, students are emboldened with a mindset of failing forward, meaning that by taking risks, they give themselves the opportunity to use feedback to improve their designs (Zielezinski, 2017).

Studies find that the fail-forward mindset can be encouraged in students by using improvisation-based learning games that spur cooperation (Knudsen & Schechtman, 2017), employing low-tech prototyping that leads to a collaborative and iterative design approach (Guha et al., 2017), ensuring that the testing phase includes sufficient time for immediate and authentic feedback (Kwek, 2017; Zielezinski, 2017), and fostering trusting teacher/mentor relationships that acknowledge caring and vulnerability while de-emphasizing teacher infallibility (Carroll, 2015). Studies have also examined the fear of failure as a common mindset of teachers, administrators, and policymakers. The interdisciplinary and creative approach allowed by design thinking may be a key to overcoming fear and making schools and classrooms “the most creative places on earth” (Harris & de Bruin, 2017, p. 69). By cultivating a bias toward action mindset in which students and educators embrace the power of prototyping and iteration, design thinking
may prove to be a prime method of preparing students for an increasingly dynamic world (Carroll, 2014).

**Measuring the success of design thinking in the classroom.** For design thinking education to move from a promising but fringe practice to a widely recognized and respected pedagogical and andragogical method, researchers will need to find compelling data on its effects (Harris & de Bruin, 2017). It may prove necessary to move beyond the traditional focus on testing math and reading proficiency and assess students on 21st-century skills used in design thinking such as critical thinking, communication, collaboration, and creative problem-solving (Wagner & Dintersmith, 2015). While the body of research on assessing design thinking skills is still developing, several studies have shown success in measuring curiosity, creativity, and collaboration.

**Measuring curiosity.** One measure of the success of design thinking may be its effect on intrinsic motivation or curiosity. While scales to measure curiosity exist, the field of education has yet to widely adopt them as assessment tools (Goodwin, 2018). One such tool is the Typical Intellectual Engagement (TIE) scale. Researchers have suggested that intellectual curiosity should be added to the more common predictors of academic success, such as intelligence and perseverance. Not surprisingly, studies have shown that learners who are intellectually curious are more likely to enjoy school and see its value. By measuring curiosity, schools would have the data to support strategies that cultivate the trait in their students (von Stumm et al., 2011). Measuring curiosity may have the additional benefit of emphasizing curiosity as an attribute that can lead to ancillary outcomes such as stronger relationships, persistence, and leadership ability (Goodwin, 2018).

**Measuring creativity.** Another potential measure of the effectiveness of design thinking is its impact on creativity. Schools that have embraced the importance of teaching creativity
have found that it is better to assess students' levels of critical thinking and collaboration than on the quality of a finished product (Spegman, 2018). Like other studies that have shown success in assessing problem-solving and human-centeredness (Aflatoony et al., 2018), the Harris Creativity Index is used to address six strategies for maximizing creativity in schools (see Appendix A). Unlike the TIE scale, which measures student-level data, the Harris Creativity Index is designed to assess schools and classrooms. Through observations that are appraised against the Index's descriptors, teachers and administrators can learn where there is room for growth in a school’s culture of creativity (Harris & de Bruin, 2017).

**Measuring collaboration.** A third measure that may prove fruitful in assessing design thinking's effectiveness is the degree of collaboration or teamwork demonstrated by students. A 2018 study conducted with high school students undertaking a design thinking project used data triangulated from observations, pre and post-survey questions, and document analysis to determine student engagement levels with the team. The study found that by the end of the project, students had developed novel collaboration strategies and a better understanding of the nature of teamwork. Most promising was that the students valued the feedback they received from their peers so highly that they began forming collaborative groups on their own (Aflatoony et al., 2018).

Such an assessment approach could be applied to any design thinking skill. Using the design thinking competency model developed by Razzouk and Shute (2012), teachers and researchers could identify a variable to be assessed, observe students engaged in the design process, and determine the extent to which the students are meeting the competencies (see Appendix B). If student progress were tracked over time, it could be a compelling demonstration of the academic and social growth that design thinking can inspire.
The role of the mentor in design thinking. As students move from being novice designers to experts, an adult or more experienced peer in the role of a mentor can serve to guide them through the design thinking process and introduce real-world application into classroom projects (Carroll, 2014). Despite a wealth of studies exploring the positive effects of mentoring within specific disciplines, few studies have sought a general, cross-disciplinary understanding of the benefits gained through mentoring. One such study undertook a meta-analysis of 112 previous studies intending to document the comparative effects of mentoring on attitude, behavior, and motivation within the realms of youth, workplace, and academic mentoring. The findings are encouraging for proponents of the use of design thinking in the classroom. They suggest that of the parameters examined, mentoring has the most significant impact on student attitude in an academic setting (Eby et al., 2008).

Similar results were found in a four-month ethnographic study of university students mentoring middle school students in an afterschool program focused on design thinking. By using qualitative methodologies to analyze journal reflections of the university students, the study found that the mentors felt a responsibility to “pay forward” or share their educational experiences, saw that the mentoring relationships were bolstered by the design thinking process, and realized the importance of having fun during learning. The study concludes that the biggest success of the mentoring project was that the mentors and middle schoolers were allowed the agency to define the problems they would tackle, which is a crucial tenet of the design thinking mindset (Carroll, 2014). Equipped with their new design thinking expertise, one can imagine the middle schoolers paying forward their experience by becoming mentors to elementary school students.

Next steps for design thinking research. The literature suggests that significant progress is being made in the field of design thinking education but that further research is
required before it can move beyond an isolated initiative and become a movement in education (Cook & Bush, 2018; Goldman & Kabayadondo, 2017; Harris & de Bruin, 2017). Part of this work is establishing a baseline definition of design thinking and refining the design thinking model (Spegman, 2018; Watson, 2015). Also key to its development will be a willingness to experiment at all levels and an understanding that failure is an expected stage of the iterative design process. It is as essential for teachers, administrators, and policymakers to adopt this fail-forward, growth mindset as is it for students (Carroll, 2015; Kwek, 2017; Zielezinski, 2017). Furthermore, to provide convincing evidence of the positive impact that design thinking can have on education, indicators for measuring the effect on students, teachers, and school culture will need to be further refined (Edelman et al., 2021; Goodwin, 2018; Harris & de Bruin, 2017).

There is an excitement evident in the literature regarding the potential of design thinking to provide a means of refocusing educational systems (Carroll, 2015; Cook & Bush, 2017; Goldman et al., 2022; Henriksen et al., 2017). Though further work needs to be done to reach a unified understanding of the definition, purpose, and evaluative methods of design thinking, and though design thinking will need to become a core strategy taught in teacher training programs before it can have a far-reaching effect on education, the trend toward action research reflected in the literature of design thinking may be the key to the realization of Dewey’s ideal of integrating educational theory and practice (Goldman & Kabayadondo, 2017). For its advocates, design thinking is not an isolated skill with a limited opportunity for application but rather “a way of thinking and being” that has the potential to transform the nature of school itself (Razzouk & Shute, 2012, p. 343).

**Chapter Summary**

In this chapter, I reviewed the literature on fear as an impediment to innovation and a root of the perceived problems facing education. A brief tour through the history of public education
in the United States highlighted how education policy has been shaped by various fears, especially the hyperbolic fear of ineffective teachers. A review of current innovative educational approaches attempted to provide a roadmap for overcoming the barrier of fear. Finally, a review of the literature supporting the study’s conceptual framework suggested a design thinking strategy for shifting our mindsets away from fear and inaction and toward empowerment and growth. In the next chapter, I will introduce the approach and methodology used for this study, including my researcher perspective and positionality, methods used to collect and analyze the data, how study participants were selected, and the technology used for participant collaboration.
A Path to Action

In this chapter, I will describe the approach and methodology used for this study; I will lay out the methods and tools used to collect and analyze the data; and I will describe how study participants were selected. I will also articulate the rationale for each of these decisions. I will describe the technology used for participant collaboration, the steps to ensure the trustworthiness of the data, and my researcher perspective and positionality. I will end with a discussion of the limitations of the current study.

Inquiry Approach

In conducting the study, I used qualitative methods that draw from the tradition of participatory action research. Qualitative researchers presuppose that knowledge is constructed, and qualitative action researchers further believe that we make meaning by working together on a problem of practice and endeavoring to effect change (Merriam & Tisdell, 2016). Participatory action research (PAR) has the specific aim of empowering participants to bring about emancipatory change in a community or system (Creswell, 2012).

The emphasis on democratizing research by collaborating with participants as equals makes PAR an appealing design method for this study. However, it was impossible to know at the outset the level of involvement each participant would have. As such, while I aspired to conduct a PAR study and approached each phase of the inquiry with the intention of encouraging maximal participation, I did not assume it in advance. One may point out, for example, that as the lead participant, I had already established the general research focus and design of the study. While this is true, design thinking and action research were chosen as the framework
methodology because they allowed the group to guide the direction of the study. In other words, each step in the process, as discovered by the collective participants, led to the next.

Furthermore, the goal of establishing a community of practice requires the express participation of the community. A community of practice cannot be imposed; it must be given the space and time to evolve naturally. Whether the community would form within the timeframe of this dissertation was unknown at the outset. Still, by fostering a network of partners who share the vision of liberating educators from stifling and inequitable education systems, this study sought to give teachers the courage to become impactful research practitioners. Ultimately, my hope was that this study would further the literature on design thinking and school innovation, connect educators who are looking to transform education, and begin to build a social business with lasting impact.

Methodology

Context of the inquiry. Given the geographic distance between participants and the anticipated global scale of the social business to emerge from this work, situating the inquiry in a virtual environment was essential. Establishing procedures that allowed for remote collaboration maximized the benefit to participants while minimizing the impact on their time. The eight participants who worked through the design thinking process with me were from disparate locations from around the country and world. By engaging in action research that aimed to build a community that led to innovation, the participants benefited from making lasting connections with other educators who are equally passionate about innovation. The thoughtful use of technology allowed us to support each other without the burden of having to travel.

Inquiry design. As I worked to build community and co-create innovative educational strategies, I complemented the tenets of participatory action research with the mindset and process of design thinking. Given the significant overlap in the aim and structure of action
research and design thinking, a design thinking-focused action research methodology was ideal for the study. In its most basic form, action research represents a cycle of action and reflection. The cycle is reflected in Stringer’s interacting spiral of “look, think, act” (as cited in Creswell, 2012, p. 584). McNiff (2017) presents a similar cycle of “observe - reflect - act - evaluate - modify - move in new directions” (p. 12). These action research cycles map closely with various models of design thinking, such as the Stanford d.school model of “Empathize, Define, Ideate, Prototype, Test” (Doorley et al., 2018) or the IDEO (2013) model of “Discovery, Interpretation, Ideation, Experimentation, Evolution.”

For this study, I used a modified cycle that combines and distills the steps of action research and design thinking into four phases: Question, Imagine, Make, and Share (Rayala, 2021). The model has the additional feature of being “journified” in that it emphasizes the connection between the action of design and the hero’s journey story structure as articulated by Joseph Campbell (1949/2008) in his seminal work on comparative mythology, *The Hero with a Thousand Faces*. The journification of action research and design thinking may prove useful in better engaging students and teachers in both processes (Kelly & Kelly, 2013; Rayala, 2021; Sonnenburg, 2017.)

The mapping of the action research and design thinking cycles is illustrated in Figure 2. The outer ring is IDEO’s design thinking model, the middle ring is McNiff’s action research cycle, and the center ring is the distillation of the design thinking and action research used for this study. Each phase of Question, Imagine, Make, and Share comprised approximately one month of the inquiry. While both design thinking and action research are intended to be reflexive and recursive, for the purposes of this study, I restricted myself to one time through the cycle. Subsequent iterations will follow, and though they will further the development of my social business, they are beyond the scope of the present study.
McNiff (2017) notes that, while action researchers agree that both action and research are necessary aspects of the endeavor, there is some disagreement regarding the ideal balance between the two elements and who exactly should be undertaking them. My researcher perspective is that the aspects of action and research should be equally balanced and that all participants should be encouraged to engage in both. I designed and carried out the study with this balanced perspective in mind and aimed to be as transparent as possible about my intentions. For example, I readily admit that I want to help create a space that will allow the design thinking mindset to thrive in education. Through this and further action research, I believe I can help the design thinking community grow while also maintaining a critical eye on its growth.
Design thinking has flourished in recent years largely because people intuitively believe that it works. I share the hope for its potential to effect change but also recognize that design thinking has the potential to be cast aside as the latest in a long line of fads in education reform. If design thinking is to succeed, it must be approached critically and rigorously. By steeping myself in the literature, conducting action research, carefully documenting our work, and sharing it, I have sought to do my part to make design thinking more accessible to teachers and students. I made judicious use of my colleagues as what Herr and Anderson (2005) call “critical friends” who can ask questions and help me “make meaning” of my findings and monitor my researcher perspective (p. 78).

**Researcher Positionality**

My colleagues also helped me negotiate the multiple positionalities I experienced during the action research process. Because I was working with other educators as they developed their own educational innovations, I sometimes felt like an outsider in collaboration with insiders. I aspired to conduct participatory action research in a “co-learning” mode of participation as described by Cornwall’s continuum of purposes for PAR. I wanted to build “with/by” relationships as I worked with the participants to co-create strategies for increasing innovation in the classroom (as cited in Herr & Anderson, 2005, p. 40). In this way, I functioned as a facilitator as the collective group of participants used design thinking to guide the direction of our inquiry and action.

At the same time, since I was part of a learning community that came together to use design thinking as the method of co-creating innovative strategies, I was also an insider working with other insiders. To succeed within this positionality, I did my best to remain cognizant of the inherent power dynamics between facilitators and course participants. I aimed to alleviate such an imbalance by being both a facilitator and a participant. For example, I participated in course
activities and presentations along with the other participants. When doing so, I put particular emphasis on noticing and critiquing my own journey. The stance of “reflective practitioner” as described by Schön, in which I share not only what I have learned in the study but also how I have learned it, served to shape my dissertation as a document of my growth as an action research practitioner (as cited in Herr & Anderson, 2005, p. 34).

**Methods**

**Overview of methods.** Herr and Anderson (2005) make the salient point that given the iterative design of action research, the methodology of an action research study is likely to evolve as the study spirals along. Considering this, I acknowledged during proposal that the intended methods could be considered more of a menu of possibilities than certainties. I anticipated that the data collection techniques would include interviews, focus groups, and observations. I thought that autobiographical data might also come into play as I negotiated my dual roles of researcher and innovator. I intended for the design thinking process to become its own data collection technique, with the actions of brainstorming, prototyping, and testing being especially useful for gathering data. While data collection did not unfold precisely as I had imagined, it hewed relatively close to the original plan.

**Interviews.** As anticipated, interviews were the first vehicle for data collection. Since action research and design thinking are collaborative by nature, the interviews took varied forms. Initially, I conducted one-on-one, semi-structured interviews with prepared guiding questions (see Appendix C). I also allowed ample opportunity for participants to steer the conversation in directions of their choosing. As we moved into the teamwork phase, I employed focus group interviews to refine our thoughts. At the close of our time together, I interviewed the participants individually for a second time (see Appendix C).
**Observations.** As our collaborative work intensified, the primary means of data collection shifted from interview to observation. By moving to observational data, I noticed details not identified in the interviews (Ivankova, 2015). I took on the role of participant-observer, whereby I both engaged in and monitored the action. The use of recording technology allowed me to participate fully in the activities while also maintaining a record of our interactions. I further address the use of technology below. An observation protocol (see Appendix D) guided my data collection for the collaborative sessions.

**Autobiographical data.** The need for autobiographical data spoke to the importance of keeping a researcher journal. As both the researcher and a participant in the action research, I was conducting the inquiry and observing myself as I did so (Bhattacharya, 2017). While autobiographical data did not figure into data collection as thoroughly as I had anticipated, keeping a journal proved invaluable in grounding me in the process and keeping an eye on my frame of reference. I employed a five-year journal in which I wrote daily and a standard journal to record analytic memos, mind mapping sessions, and periodic milestone reflections. Tracking decisions and concerns in a journal was useful for modifying the study, analyzing data, and maintaining a written record of our activities. It was also helpful for beginning to answer for myself the research question on the perceived changes to the mindset of educators who participate in the design thinking process. Since our perceived mindsets revolve around the stories we tell of ourselves, having a way to capture those stories was important. In this way, while not strictly autoethnography, the study incorporated elements of narrative inquiry (Herr & Anderson, 2014).

**Participants**

As is customary with qualitative research, I used purposeful, criterion-based sampling to select the study participants (Merriam & Tisdell, 2016). In doing so, I assembled a team of eight
participants with sufficient expertise, creativity, and enthusiasm to undertake the action of creating a virtual community of practice that supports innovative educational strategies. Criterion-based sampling is even more critical when attempting participatory action research because the participants selected will function largely as co-researchers (Merriam & Tisdell, 2016). Through the initial interviews, I used the criteria mentioned above of expertise, creativity, and enthusiasm to assess each participant's suitability. Considering the virtual nature of the study, I also took into account prospective participants’ access to and facility with collaborative technologies.

The participants were recruited from a 16-week online design sprint that I co-facilitated in the spring of 2021. While traditional design sprints, such as the ones run by Google, are intensive five-day workshops, our course adapted the process for a virtual setting by meeting once a week for 90 minutes. The course was geared toward educators looking to take on a project of personal or professional interest that would have a positive impact on learners. By the nature of having registered for an online course focused on educational innovation, the educators may have been predisposed to participate in the formation of a virtual community of practice. However, their participation in the action research study was not assumed. Each participant was recruited in the manner described above. Furthermore, since we were all undertaking our own projects, participation in this action research study was understood to be in addition to other work done during the course. The degree to which each participant had time to dedicate to exploring the research questions related to obstacles to innovation in education and strategies to overcome them dictated how close this study came to the truest form of participatory action research. The demographic information of the eight study participants is presented in Table 1.
Table 1  
*Participant Demographics*

<table>
<thead>
<tr>
<th>Location</th>
<th>Educational Setting</th>
<th>Gender</th>
<th>Race</th>
<th>Age</th>
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<td>50s</td>
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<tr>
<td>New Jersey</td>
<td>K12</td>
<td>Female</td>
<td>White</td>
<td>50s</td>
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<td>Secondary/Post-secondary</td>
<td>Male</td>
<td>Black</td>
<td>30s</td>
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<tr>
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<td>Post-secondary</td>
<td>Male</td>
<td>White</td>
<td>50s</td>
</tr>
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<td>Community youth</td>
<td>Female</td>
<td>SE Asian</td>
<td>20s</td>
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<td>White</td>
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<td>North Carolina</td>
<td>Professional Development</td>
<td>Male</td>
<td>White</td>
<td>60s</td>
</tr>
</tbody>
</table>

Data Collection

Data collection occurred in four stages that followed the four phases of the design thinking process: Question, Imagine, Make, and Share. The study began in March of 2021, with each phase spanning approximately one month. As illustrated in Figure 3, the first step in the Question phase was to answer the question, “Who are you?” To do so required self-reflection in the researcher journal and initial interviews with participants. Since the participants were in disparate locations, the interviews took place via video chat. These interviews, and all subsequent ones, were transcribed using Google Recorder, an app that auto-transcribes spoken words in real-time with high accuracy. After the initial interviews, we began the collaborative work of defining our challenges through empathic exploration. Data was collected through our notes and the recordings of our group sessions.
Figure 3. Design journey. Adapted from Rayala (2021).

Once we could answer the question “What is your quest?” we entered the Imagine phase. During this month, we collected the output of our brainstorming sessions as we narrowed our focus. The data from this second round informed the direction of our group ideation sessions. Here again, the transcripts of our interviews and group sessions provided rich data.

Crossing the threshold into the Make phase required us to have answered the question, “What did you find?” With the idea for a specific strategy firmly in mind, we began the work of designing and prototyping. Just as our notes were valuable data in phase one, so were the artifacts that emerged from the creative sessions. The transcripts of the sessions were helpful in providing data that documented both the product we created and the process we used to do it.

The final Share phase asked us to take what we had created and answer the question, “How will you change the world?” Congruous with the evaluation step of action research, this
phase involves testing our creations and telling our stories. The measures we employed to evaluate our products and the artifacts we created to communicate our journeys provided yet another crucial data set. Lastly, the cycle led us back to the question we began with: “Who are you?” By changing the world, we changed ourselves, and I used another round of individual interviews to reflect on how engaging in the design thinking process over the last four months might have evolved our mindsets.

Data Analysis

The constant comparative method was essential to the success of the study. As a qualitative, action-oriented study using the design thinking process, it was necessary to collect and analyze data from each phase before moving on to the next phase. Indeed, the inductive nature of design thinking requires that the output of one phase guides the direction of the next. The data collected during the need-finding Question phase dictated the problems we brainstormed solutions for in the Imagine phase. The solutions we decided upon in the Imagine phase directed our prototyping in the Make phase. The nature of the prototypes directed our efforts to test and share our results in the Share phase.

Using multiple coding cycles, I coded our notes and transcripts and began to identify possible themes and patterns. Concurrently, I wrote analytic memos to reflect on the potential implications of the emerging themes. The cycle continued as I used in vivo coding to categorize themes emerging from the memos (Saldaña, 2016). I used member checking to ensure that my interpretation of the data was consistent with the intentions of the participants. In addition to traditional member checking, I conducted group analysis, as described below, to identify important themes. Triangulating the data among the interviews, observations, and the researcher journal provided further measures of internal trustworthiness.
Use of Technology

Given that the study participants were in multiple locations throughout the world, the use of technology to connect us was critical. Since web-based solutions would be beneficial, I explored various options before beginning the study. Privacy concerns need to be weighed when handling any data, especially when sharing with participants. Password protection was a requirement for any data stored online. One option was Google Workspace (formerly G Suite) platform, which would allow us to securely store our data in the cloud and share documents when necessary. It also integrates directly with Google’s videoconferencing application Meet and collaborative tool Jamboard, facilitating virtual interaction. Another option was to use a web-based application specifically designed for research groups. One such application, called Dedoose, would allow us to store and code data. As with Google’s platform, Dedoose gives researchers the option of sharing data with collaborators. While the added functionality of coding and analyzing data on the web may have been worth the investment and while I found Dedoose helpful in organizing and reviewing the literature presented in Chapter 2, in the end, I decided that Dedoose was too expensive and instead used the more economical, yet still powerful and versatile, Google Workspace.

The use of the Google Jamboard software proved to be invaluable in facilitating collaboration throughout the study. For example, after conducting the first round of interviews and doing initial in vivo coding, I used Jamboard to place virtual Post-it notes with participant data on a virtual workboard. The real-time collaborative function of Jamboard allowed us to analyze the data as a team. As we identified themes within the data, we grouped the notes by changing their color from the default yellow to blue, green, orange, and pink. Figure 4 shows an example of remote team analysis using Google Jamboard.
The majority of the interviews and all of the group sessions took place on the Zoom video conferencing platform and were supplemented, when appropriate, with the collaborative software described above. However, for the second round of interviews, I gave participants the option of meeting me on a virtual reality platform called Spatial.io. One advantage of Spatial is that it is accessible not only through VR headsets but also via desktop browsers and mobile apps. In several cases, technical restrictions prevented us from meeting in Spatial and necessitated
moving back to Zoom, but for the other interviews, participants met me in a virtual art gallery. I decorated the virtual gallery with a hanging art installation word cloud of the most frequently used words during our group sessions. At one end of the room, I posted on the walls the work we had done in identifying obstacles to innovation in education. I began the interview in front of these obstacles, and as we transitioned to talking about strategies to overcome the obstacles, I led the participants to the other end of the room, saying, “We’re moving away from the obstacles now so we can discuss possible solutions.” Figure 5 provides a screen capture from one of the interviews conducted in virtual reality.

Figure 5. An interview in virtual reality.
Ethical Considerations

In addition to obtaining formal permission to conduct the study from the Institutional Research Board of the University of the Pacific, I also asked for explicit, written permission from each participant (see Appendix E). While I did not involve children or other vulnerable populations in the study, sensitivity and transparency remained of the utmost importance. Participant names, sites, and additional identifying information remain anonymous. As stressed by McNiff (2017), I strove to create and protect “a reputation for integrity” in all interactions with participants and publications of my findings (126).

Limitations

Although a quarter of the study participants were either female, people of color, or under 40 years old, the majority of the participants and the lead researcher were white males over 40. For a study that seeks to empower educators, the lack of diversity is a notable limitation. Future research would benefit from having a participant group with a greater representation of younger educators, people of color, and people with marginalized genders. Likewise, in developing a global community of practice that recognizes the strength and importance of diversity, equity, and inclusion, recruitment efforts should be aimed at creating as diverse a community as possible. While another quarter of the participants lived outside the United States, future action research would also benefit from a more international participant group.

A second limitation of the design of this study is the relatively small window for data collection. While four months is an adequate amount of time to conduct a design thinking/action research cycle, having the time to iterate with another turn of the action research spiral would have been useful. This concern is mitigated in part because the close of this study was not the end of the action. Indeed, I intend this study to be only the beginning, with future action research continuing long after the dissertation journey is complete.
Chapter Summary

An increasingly standardized and assessment-driven educational system is failing to meet the needs of many students. When students lose their sense of agency, their love of learning is diminished and replaced with a fear of failure (Harris & de Bruin, 2017). The prototyping mindset inherent in design thinking may mitigate the fear of failure by focusing on rapid iteration rather than striving for perfection (Carroll et al., 2010). This qualitative, action research study is situated in a design thinking/growth mindset conceptual theory that asserts that the design thinking process can serve as a meaningful growth mindset opportunity for teachers and learners. Specifically, the study sought to use design thinking to collaborate with a team of educators to co-create strategies for building a community that supports teacher innovation.

The study used a design thinking/action research methodology that moved through four phases of Question, Imagine, Make, and Share. As the team of participants worked through the design thinking process to identify perceived obstacles to innovation and create strategies to overcome them, I used the constant comparative method to analyze the interview data, observational notes, analytic memos, and journal entries. We experimented with various technology solutions to bridge the physical distance between participants, and I used member checking, data triangulation, and critical friends to monitor the trustworthiness of the data and findings.
CHAPTER 4: FINDINGS

Empowerment by Design

In this chapter, I will describe the findings that the participants and I discovered in the data. To meet the study’s purpose of building a virtual community of practice that supports innovation and inquiry, we used design thinking and action research as vehicles for developing resources and strategies to help educators become empowered research practitioners. I will share the fruit of our inquiry as it relates to the following research questions that guided the study:

1) What obstacles to innovation in education, if any, do educators perceive to be most prominent?

2) What strategies empower educators to create innovative educational solutions?

3) In what ways do educators describe changes, if any, in their mindset when they engage in design thinking?

Obstacles

To attempt to answer the research questions, we followed a four-phase model of design thinking: Question, Imagine, Make, and Share. The Question stage began fittingly with an interview. I spent between 30 and 60 minutes with each participant to learn how they situate themselves in relation to the study and what obstacles they had noticed holding back progress in education. The first round of interviews was conducted remotely using the Zoom video conferencing platform.

While the participants and I found multiple themes regarding obstacles to innovation in education, the most prominent was (1) an oppressive system. Indeed, the other four themes of (2) inadequate teacher training, (3) outdated instructional models, (4) overly standardized instruction and assessment, and (5) lack of resources could be viewed as interrelated subsets of the larger systemic obstacle, as illustrated in Figure 6. I will begin with the overarching obstacle.
of an oppressive system and then address the sub-themes and how they relate to the system and each other.

Figure 6. Obstacles to innovation in education.

**An oppressive system.** The prevalence of an oppressive educational system was by far the most mentioned obstacle to innovation in education. It was discussed both explicitly and implicitly. I will describe implicit references in the next section dealing with the subfactors obstructing progress and innovation in education. Explicit references to an oppressive system highlighted an existing hierarchy of oppression in which teachers are perceived to be at the bottom, local school and district administrators are one rung up, followed by “the state,” by which participants meant state governmental agencies that oversee education in each of the
United States, followed by politicians and policymakers, and lastly, above it all, or perhaps permeating every level, the general power of the status quo and the specific pervasiveness of white supremacy.

The hierarchy was succinctly described by one participant with the comment, “Pardon the expression, but shit runs downhill,” and is visually represented as such in Figure 7. At the bottom of Shit Hill are teachers, who, along with their students, clearly bear the brunt of the oppressive system. One participant commented on having “many tears shed” on account of being told by administrators, “You didn’t do this. You didn’t do this.” Another noted the disconnect between teachers and administrators and said that “teachers are worn thin” and are constantly needing to pick their battles in the workplace.

While current school administrators were not part of the study sample, the participants recognized that school administrators also feel the pressure of the oppressive system from district, county, and state educational agencies. In addition, they noted that there are “restrictions set up by the existing system” that teachers need to overcome and that these restrictions sometimes come from state education agencies who make it difficult for teachers who are trying something innovative in the classroom:

They're just making it harder and harder every five years for me. And it's like, yeah, I'll knock it out of the park because that's what we do. And so will my colleagues. They all do it. We have never been declined, but it's like we're just getting beat up.

The participants also noted that state educational agencies feel pressure from state and national policymakers, noting that:

It's political. So, the conservatives come in, and they want a back-to-basics approach where people learn facts and dates and 1066 and William the Conqueror and Ireland’s story of glorious whatever. And then maybe Labor come in, and they would like a focus more on critical thinking, they'd claim, slightly softer skills, more teamwork.
Furthermore, participants recognized that the inertia of the status quo itself is an obstacle in that “people just don’t like change; they’re just resistant to it generally.” More specifically, participants expressed that the status quo values some groups of people over others. Participants pointed out that the status quo of traditional education practices can be racist and ableist, and that regardless of our background, we are taught to follow them. One participant noted that “a white supremacist society likes order and control” and that embracing change means going outside one’s comfort zone and facing one’s role in an inequitable society:

To me, white supremacy is a value system, and it places value on certain identities, and that makes the non-prioritized identities or values, whatever that may look like, it gives weight to it being disposable. Like, “Oh, we don't need to invest in this, we don't need to make sure that this is something that we're learning, these people aren't that important, we'll go ahead put the pipeline through there,” you know? So, that kind of thinking, it's really dangerous because it makes a real impact on people, and specifically here in the US, based off of the history that we have, there is a general status quo that is in place, and regardless of where you came from, you come into that status quo. You've learned to recognize it. You've learned to follow it to a certain extent.

Figure 7. Shit Hill.
Whether through a hierarchical system of fear or a status quo that places greater value on certain groups of people, the oppressive educational system is the primary inhibitor of innovation. As one participant put it, “A system that penalizes you for deviating from the path is antithetical to being creative.”

Inadequate teacher training. The second most mentioned obstacle to innovation was inadequate teacher training. Participants recognized it as a subset of the oppressive system, noting that teachers are still being taught “archaic learning methods” of a “system developed over 100 years ago.” They also acknowledged that education is a complex space where progress relies on “people, not just tech.” As such, participants were clear that the “day-to-day grind” of teachers prevents effective professional development (PD) and that when PD occurs, it does so with little “cross-pollination” between teachers and schools. The siloed PD coupled with uneven teacher training programs leads to a phenomenon one participant described as a dichotomy between content experts and teaching experts:

I mean we had people teaching science who had no science training. They were good teachers, so we're trying to bridge between people who actually know science and understand science and who can't teach. Because we've got the scientists who can't teach it and then we've got the teachers who are very good at teaching but don't know the content.

According to this participant, the phenomenon is especially prevalent in higher education, where teacher training is not merely inadequate but often “non-existent.”

Another dichotomy discussed by participants is the one between “energized” teachers and “experienced” teachers. Like the contrast between content experts and teaching experts, participants identified the lack of overlap between teachers with energy and enthusiasm and those with experience. On a more hopeful note, one participant expressed that, while teacher training is inadequate, it is at least improving, noting that the current generation of “teachers coming up are much better” than the previous generation.
Outdated instructional models. Closely related to inadequate teacher training, and almost as often mentioned by participants, are outdated instructional models. Here, the archaic learning methods that lead to inadequate teacher training are being called out directly. Specifically, participants identified that “teachers have not been expected to help students contribute to their own learning.” Instead, teachers are often unknowingly perpetuating a fear-based system in which “if the teacher says, ‘no,’ the learner says, ‘I’ve failed.’” Too often, teachers are “imparting knowledge by force” rather than allowing students to be in the “driver’s seat” of their learning. Participants acknowledged that there are isolated examples of research-based innovation in schools but that their implementation is inconsistent:

There's some quite good work around research and research-led innovation in schools in the UK. So, there’s people doing that work. It's just not everywhere, you know. It's kind of lumpy. So, I guess it takes a while to spread through the rest of the community of teachers. And maybe if teachers got together more in conferences or something, it would spread more rapidly, but they're in the day-to-day grind of teaching, and when they do meet up for the training, it's within the school normally rather than being somewhere separate. I don't know how it works in the US, but here [in the UK] you get six days a year of training days, but they normally happen in the school, so you're not in a wider community of teachers. So, there's not necessarily a chance for cross-pollination between schools.

This participant added that most innovative practices are often not part of the curriculum but rather happening in after-school clubs.

Overly standardized instruction and assessment. Ironically, while isolated and non-uniform (or “lumpy”) innovation was identified as an obstacle, so too was overly homogenized innovation. While participants lamented that we are “still teaching school the same way that we have for hundreds of years,” they also recognized that, even when there are changes, overly standardized instruction and assessment hinder innovation. One participant noted that there is “more change than innovation” in education today. Another commented that teachers often do not have time to become proficient in the new methods being imposed on them:
If you wanted to be contrary, you could say there's been too much innovation in schools. You could say the curriculum changes every two minutes, and no one ever gets used to the style of teaching you're actually doing or gets to feel comfortable about it before everything gets swept away.

Even worse are the standardized assessments that participants noted are required even for primary school students and are often seen as ways to assess teachers rather than students. The standardization was reported to be a by-product of the oppressive and hierarchical system, with dictates coming from the federal, state, and district levels. However, participants noted that, even at the local level, schools and departments were overly standardized and centralized. One participant commented that having a single administrator overseeing a large department is “ridiculous because in industry no one would be in charge of 26 people. That would be split up into two, maybe even three teams.” A call for greater autonomy for teachers and students was evident in the data:

I see with the academics there's still these challenges that they face trying to fit it all into this neat little package. I have seen some exceptional teachers that found a way . . . I found out that they had a lot of frustration because the APs have their agenda and I think there's sometimes a disconnect with administration. I don't know if that's always the case. And I think sometimes our academic colleagues are just kind of worn thin and they're like, I don't know what I want to fight and what I don't want to fight.

**Lack of resources.** The final and least cited obstacle to innovation in education discussed by participants was a lack of resources. While not all participants agreed, some expressed that a lack of resources keeps teachers from being more creative and that spending priorities are not aligned with what is best for society:

We just don't invest enough in education. It is by far the most important thing, right? It's more important than the military, and it gets a paltry amount of money to support it. No wonder we're not doing so good.

While a lack of financial resources may be implied in the comments of other participants, they more explicitly identified time as the resource in the shortest supply for teachers. Especially for teachers in public school systems, participants recognized that teachers are stretched thin:
I guess you’ve got a history element, you know. It's easier to do what you've done. There's a time element. Teachers are stretched for time. It's hard to carve out space where you can be at peace and actually reflect and consider your practice as a professional.

**Imagining and Making New Solutions**

After completing the Question Quest, the participants and I entered the Imagine Quest. Analogous to the ideation or brainstorming phases of other design thinking models, our Imagine Quest was the opportunity to begin to dream up potential solutions to the problems we had identified in the first quest. We used sketch-notebooks during this second quest to create mind maps and other forms of visual thinking that first broadened and then honed our ideas. We also came together in mini-charrettes—short but intense design sessions characterized by their participatory nature—to help each other expand our thinking on potential solutions.

When we finished the Imagine Quest, at the midpoint of the design sprint, the participants were ready to enter the Make Quest and begin developing a tangible representation of their innovation. For some participants, the product of the Make Quest was a model or a simulation of their solution; for others, it was a minimal viable product ready for launch and testing. I saw it as critical to the study that the participants, while working with me to co-create solutions to obstacles to innovation in education, were also experiencing the design thinking process as they developed their own projects.

**Participant profiles.** The participants’ projects were truly remarkable. One participant, a teacher at a prestigious high school in New York City, chose to take on his school’s 85-year tradition of isolated silos of learning. By taking his class of sophomore students on an exploration of the connections between their disparate courses, he aimed to inspire students, teachers, and administrators in his school and worldwide to embrace a more holistic,
comprehensive, and interdisciplinary approach to learning. Here is how he responded when I asked him what he was most proud of with his project:

One of the things that really stuck with me is how it grew, the whole process. I had no idea it was going to be about collaboration between, or trying to figure out the connection between, academics and what I do. And as it started to unfold, I still kept seeing this kind of pie in the sky, kind of like, “Oh, this is going to be great,” and “this is going to work,” and I'm like, “No, this is not easy. We've tried this countless times in the 13 and a half years I've been teaching. How do I get this to work?” And it was challenging, but I really love how it unfolded, and I think the best part is I'm still thinking about it. I'm looking forward to working on this over the summer. You know, it felt very easy to talk to academic partners about what I'm doing and found that they really want to help me and they want to be a part of this. And so, I guess that's the main thing for me. It's the whole process and just kind of like a flower, a seed was planted, and we kept nurturing it over the weeks, and it grew into something.

Another participant, a teacher and educational entrepreneur from Uganda, wants to give refugees in East Africa access to high-quality education. He used the course to begin developing a secondary school and university that empowers refugees by involving them in the design and creation of the school, thereby establishing a school of design for and by East African refugees. He also expressed pride in how his project evolved:

The original idea that I had about education, or the perception which I had about education, actually, it has opened up the doors to welcome more input and more citations that will help expand my work and then tackle the real problem that is holding back refugees from accessing education. For example, in my original approach, I was just thinking about creating and maintaining a university and high school that would have refugees attending school. But now, it has moved beyond just refugees attending school to empowering them. So, how has this training helped me empower them? In the design process, as we use design in the high school and the university level, it means someone, the refugees themselves, would be able to use bottom-up design processes to design simple, effective products using locally-available materials with small-scale energy features which enhances employment opportunities.

Another participant, a former genetic researcher who now teaches chemistry at a high school in New Jersey, identified that an obstacle to helping her students understand science is that many adults in positions of power do not know or accept basic science concepts. She
developed a model of using social media to counteract pervasive misinformation and present adults with easily digestible facts about science:

I didn’t want to gear it toward scientific people or people who are already interested in finding out new stuff in science, but rather gearing towards the population that maybe didn't have access or didn't realize. It's kind of a “you don't know what you don't know” kind of thing . . . but one area that I have been really having a mind shift in is the target audience and empathy. Whatever I'm doing, who am I doing it for? And what exactly do they need? Not what I think they need, but what do they think they need? And so that's kind of tricky sometimes to try to figure out, but I think that's one of the crucial aspects of design thinking that has really helped me to be a better communicator, be a better teacher.

A participant from the United Kingdom recognized the impact that blockchain technologies are having on how we manage complex data. Seeing the potential for blockchain to decentralize not only banking but also education, he began developing a platform that uses cryptocurrency to compensate teachers for contributing to a database of thousands of micro-skills in every discipline that could someday be used by artificial intelligence to tailor to a learner’s specific needs. He spoke of the promise and pitfalls of individualized learning:

I believe there are some things that are difficult to learn without some prior knowledge and some scaffolding. I think it's very difficult if you do have an interest in something particularly complex, like quantum physics or something, and then to try and start yourself from nowhere to get there without anyone to help teach you. There's mentors, but largely what is suggested is that you put together the course yourself. I think it needs some scaffolding. And also, I do worry about being exposed to enough different things to get a sense of what you really like. If you’re focusing on specific problems, do you ever know that you particularly like the art of the Italian Renaissance? I just worry about having the chance to discover a wide range of things. And I'm not against people being well-rounded people either. I think scientists should know some literature and art and I think artists should know some science. A pure empowerment system allows you to focus just on the things you particularly like to an extent and ignore all the rest.

Another participant, a community activist in Sacramento, California, saw the opportunity to use the design sprint to transform her community. Using a culturally sensitive approach of radical listening, she created a grassroots model for a community center program in which a diverse group works together to create a fairer and more equitable future. She described what her project would look like when it succeeded:
So, okay, we want to dismantle, we want to get rid of this system, replace it with something else. It's not like a general end goal, right? It is something that needs to constantly be practiced. Once we reach liberation, once we reach equality, it's not like, “Okay, cool, I crossed that finish line.” It's there forever and needs to be consistently practiced. I think that's what it would look like for my particular project. If this goal was actualized, in reality, it would be people every day struggling and supporting and figuring out how to continually do better in the world.

Also focused on equity was a doctor and educator in Charlotte, North Carolina, who in addition to treating his patients’ physical needs, has a passion for creating a more equitable society. He developed a minimal viable product that sparks meaningful discourse on the social media platform Clubhouse by encouraging people to come together to ask “big, hairy, audacious questions.” He explained what he was most proud of in the work he did on his project during the course:

What I'm most proud of is I was already working on this, but it allowed me to have a different perspective on what I was developing, which I wouldn't have had. Looking back, it's difficult to actually differentiate between the two, but there's no question it did. And I think some of the outcomes was that it actually strengthened my commitment to do the project. It offered different perspectives on what I was doing, and I knew I was going to do something with it. I wasn't too sure what it was going to be, and since that time, it's evolved considerably.

A participant who came from the theme park industry and now works as a university instructor and consultant in Orlando, Florida saw the opportunity to employ the lessons he learned in his previous career to improve education today. During the design sprint, he tested his ideas and began writing what will eventually become a book on creativity that he plans to publish. He spoke of the power of a community of practice as it relates to his book.

I think one of the things that makes all of us a great team is that we all have a lot of experience in our areas, we all have a lot of connections, we all have that drive for innovation in thinking outside the box, and as my new book explains, creative cross-pollination, right? I think it's going to be filled with some good information. The topic is creative cross-pollination, which is basically how you take two things that don't have anything to do with each other and make a connection. In my mind, it's something that is just innate in every human being. We've been doing it since we were cavemen and writing using berries to make paint for the walls of our caves.
A final participant located in Los Angeles, California with nearly 50 years of experience at all levels of education recognized the limitations of current standardized tests, especially those used for college placement. He used the four quests to develop and test a model for a new form of project-based assessment that learners at all levels can use when approaching college and career. He recognized the obstacles ahead before such an assessment system can gain widespread acceptance:

Like all innovations, we will have to overcome the natural challenges of undeveloped infrastructure, higher initial cost, lack of availability and equity, perceived usefulness, and resistance to change that all innovations face. Future learners will have to be retrained to accept and trust student-centered project-based learning. Families will need to be convinced that this paradigm shift leads to future, high-level success and satisfaction for their children. Teachers will have to be retrained to become more navigators for pathfinders rather than teachers of students. Administrators will need to be retrained to recognize and value student-centered project-based learning. Higher Education will have to not only train future educators differently but will have to switch from standardized test scores to a broader inventory of knowledge, skills, and dispositions to recruit students and predict success. National teaching and assessment systems will need to switch from current highly-profitable, subtractive, standardized testing and textbook publishing to more valid but equally reliable additive inventories of learning achievement.

At the close of the course, we held a showcase where we shared our creations. Being both a facilitator and a participant in the design sprint, I shared this study’s progress and emphasized our collective efforts to establish a community of practice. I encouraged the participants to recognize that the relationships we have formed will be invaluable as we continue to develop our projects. Again, seeing myself as a co-participant in this study, I would be remiss not to share some of my thoughts, written in my researcher journal, regarding my personal connection to the topic of study:

The subject of my current study is, at its core, failure. More precisely, and on a very personal level, it’s that nagging feeling that no matter what I’ve accomplished, I should have done more. Read more books and written some. Created more and had the courage to share it.Built more relationships and gone on more adventures. In a very real sense, this exploration is a new beginning. At the age of 45, with a job and a marriage and a life
more or less secure, with children who are no longer children, I’m ready, past due really, to begin again. And the first step, and every step after that, is to sit down and write.

Strategies to Overcome Obstacles to Innovation in Education

After journeying through our four quests of Question, Imagine, Make and Share, and having each produced a prototype, model, or minimal viable product and shared it, I interviewed the participants again. This second interview sought to learn what we were proud of in the work we did, what strategies we discovered on our journey, and how our mindset shifted, if at all, along the way. While the first round of interviews focused on obstacles to innovation in education, this one was about finding solutions.

What emerged from the interviews was a clear and consistent call for community, specifically, a community of practice with a shared philosophy of empowerment by design. Prevalent in the data were three design mindsets necessary to foster empowerment: action, growth, and inquiry. In this section, I will present the findings on potential solutions to overcoming obstacles to innovation through communities of practice focused on empowerment by design, and the mindsets of action, growth, and inquiry. I will also describe the relationships among the concepts of a community of practice, empowerment by design, action, growth, and inquiry, as illustrated in Figure 8.
A community of practice. The concept of a community of practice was the most often discussed solution for overcoming the obstacles to innovation in education. It was expressed in various terms—“a support system,” “an ecosystem of interaction,” “a beautiful thread,” “an epicenter,” and, in what may have been a fortuitous mispronunciation, “an epic center”—and it had five main attributes: Inclusive, Integrative, Informational, Immersive, and Interpersonal.

Inclusive. It was essential to the participants that their community of practice be inclusive of “different cultures in different places around the world” and especially of marginalized groups. One participant called for a “platform for the lost voices” where refugees and other marginalized communities could have their voices heard. Another stressed the importance of being intentionally inclusive of those “experiencing inequity,” noting that many
do not have access to technology to facilitate a community of practice in a virtual setting. Yet another participant agreed that, for those struggling to survive, it is “difficult to engage in self-care” let alone “community care.” She also noted that we can better engage with the community by investing in ourselves and becoming a resource for others. I will further explore the idea of empowerment later in the chapter.

**Integrative.** Many participants noted that for a community of practice to be successful it should be not only inclusive but also integrative. In addition to the concept of “an ecosystem of interactions,” the metaphor of breaking down boundaries was also common. At the school level, one participant spoke of diminishing boundaries between classrooms and of connecting the academic disciplines. He noted that to make schools more like communities of practice, it may be necessary to reimagine the physical design of schools with studio spaces instead of divided classrooms and with “teachers floating in” rather than students always moving from room to room. In this way, students would better connect what they are currently learning to past knowledge. At the enterprise level, other participants mentioned removing the boundaries between educational entrepreneurs and investors and between smaller educational companies and customers who are inundated with advertising from a handful of “ed tech giants.” At the most general level, another participant advocated for the boundary-breaking concept of “creative cross-pollination,” in which members of a community find inspiration in each other’s work and discover solutions that integrate seemingly disparate ideas into something novel and surprising.

**Informational.** Participants also recognized that an effective community of practice should be, at its core, informational. This function was crucial to participants who saw too much misinformation and disinformation in the world. One participant pointed out that it has become increasingly difficult for some to gather reliable information in this “info tech world,” and that a community of practice could be a helpful resource. Similarly, other participants saw a
community of practice as a more effective source of high-quality professional development generated by and shared with the community. In this way, the community is an opportunity for members to pass on their knowledge.

**Immersive.** Participants also described how a community of practice should be immersive. Immersion was especially vital when considering a virtual community of practice. One participant noted that maintaining engagement is critical but challenging in an online setting. Another participant pointed out that some of his students struggled with remote learning during the pandemic while others thrived. Likewise, during our course, there were times that limited internet connectivity negatively impacted the collaborative experience of some participants. According to the participants, learning communities should be exciting peak experiences for members, and without adequate computing technology and connectivity, the immersive experience is hampered.

**Interpersonal.** Lastly, participants emphasized that a community of practice must be interpersonal to succeed. They saw that community members are looking to feel that they are not working “in isolation.” Participants expressed the need for a team to support them in their work. During the design sprint, we used the charrette process, in which partners come together for an intense design session. Participants noted that inherent in a charrette is a collaboration between team members with varied perspectives. In short, interpersonal relationships are crucial.

**Empowerment by design.** While the five I’s describe the characteristics of an effective community of practice, what truly defines a community of practice is its sense of shared identity. It is what one participant described as “how we are living life and what are our values and ideologies.” The overriding shared principle of our emerging community of practice can be described best with the phrase empowerment by design. The concept is rooted in the
understanding that, whether intentionally or not, all social structures have been designed. As one participant put it, “We design and cause poverty, and we design and cause climate crises. We also design and cause poor learning community outcomes.” Every participant acknowledged that once one accepts that everything is designed, one can intentionally design for good.

The concept that arose again and again in the interview data was learner empowerment. It was expressed by one participant as: “The arc of history is bending towards children, particularly, being in control of their own learning and towards a kind of empowerment.” The participants recognized that for learners, and especially younger learners, a sense of agency makes all the difference. One participant noted that the major difference between students who are on a college track and those who are not is their sense of self-worth, which is tied to feeling in control of one's life and learning. Participants described using a “bottom-up design process” that allows students to have a say in what their school looks like.

For teachers, empowerment by design means creating an environment that brings out the learner's natural learning curiosity using the power of design. Training teachers in the human-centered design process can empower students to maintain greater control over their learning. According to one participant, for administrators and policymakers, it will be critical that they are “retrained to recognize the value of student-centered project-based learning.” And for all of us, learners, teachers, administrators, and policymakers alike, we will need to empower each other to become “heroes, who don't fear change.” As another participant put it, we need to be the “Willy Wonkas of education.”

Three community of practice mindsets. Participants articulated three mindsets that will be necessary if we are to become the makers of music and dreamers of dreams in a community of practice focused on empowerment by design. The mindsets of action, inquiry, and growth
appeared throughout the data. While the three mindsets are largely interdependent, I will outline how the participants described each mindset in turn.

**Action mindset.** Various participants articulated an action mindset as one in search of “tangible results,” “practical proofs of concept,” and “something we can actually get our arms around.” Another participant summed up the mindset with the aphorism, “Don't wait to begin your life. Start doing things immediately.” Several participants highlighted the importance of project-based learning that is “student-centered” and based on “real-world problems” with the goal of “creating designers who later co-design services, facilities, systems, [and] policies backed by evidence in their community.” As one participant experienced first-hand, design-oriented project-based learning has the ability to empower students because it “reignites a little spark in them that has been dormant,” noting further that our sprint sessions reflected this action-oriented mindset. Another participant agreed that the course we were taking together “wasn't just reading stuff. It was a very active workshop.”

The participants believed that the action mindset inherent in a community of practice that is focused on empowerment by design benefits both teachers and students. One participant who uses design education in the classroom noted that the action mindset encouraged him to “practice what I'm preaching” and to apply “what I'm actually teaching to how I teach.” Several participants recognized the value of action research in better meeting students' needs. One was considering administering “an identical questionnaire at the beginning and end” of his course to assess its effectiveness better. Another mentioned taking advantage of having three sections of the same course to “mix it up” with two of the sections and use the third as a control to measure the impact of various interventions. Another noted that he could use the evidence gained from action research conducted with and by marginalized groups, such as refugees, to spark dialogue
with partners, with the hope that presenting evidence would lead them to “implement what the marginalized have discussed and designed.”

One participant postulated that “an intense positive experience,” such as a project-based design sprint, could create a shift in the neurolinguistic programming of learners and teachers and may ultimately lead to “a shift in culture.” Another participant described how liberation needs to be “constantly practiced.” She defined a thriving community of practice with an action mindset as “people every day struggling and supporting and figuring out how to continually do better in the world.”

**Growth mindset.** Another mindset of an effective community of practice common in the data was that of growth. Participants engaged with the concept of growth most immediately with the projects they were undertaking as a part of the course. They described being surprised by “how their projects evolved over the weeks,” how they “didn't stand still,” how “they grew,” and how they started “to blossom.” The metaphor of the flower was popular. One participant noted that during the Question Quest, “a seed was planted and we kept nurturing it over the weeks, and it grew into something” and that his project was now about “planting seeds with students and colleagues.”

Others said that going through the design thinking steps made them more aware of their project's growth as “a process.” Those participants who were seeking to start organizations or build communities also recognized the importance of the growth process and especially of having a “growth plan” or a “blueprint” so that “everyone's got a shared interest.” Another participant observed that a growth mindset is the “culture” in which the reimagining education can flourish.

Other participants emphasized the role of “persistence” and “grit” in the growth process, stating that a goal in education should be to create lifelong learners who believe “you might be
great, but you can still improve; you can still get better.” For these participants, addressing our relationship to failure was important. One mentioned that students sometimes feel they are failing if they don't understand something immediately. Another noted that instead of a pursuit of perfection, learners need to believe that “if we fail, we're going to try it again. We're going to figure out a better way.” Another participant concluded that, by cultivating a bias toward action and growth, “learners can grow mentally, emotionally, physically, and behaviorally.”

**Inquiry mindset.** Participants highlighted a final mindset of inquiry. The mindset was epitomized by one participant with the observation, “I'm finding more questions and I'm finding solutions, but I think the questions are actually very helpful.” Participants expressed the mindset also as being “intentional,” “self-reflective,” “aware,” and “mindful.” One participant commented that we could address our fear of failure by being “more intentional about self-reflection” and having “very intentional conversations reflecting on where that fear of failure comes from.” Another participant described an increased awareness of his process of teaching design thinking and of encouraging students to “create a point of view to be mindful of what they're doing.” Another commented that his project was infused with the spirit of inquiry:

> I think the whole methodology I'm trying to develop, it's not about frameworks teaching people how to do things. It's not about content at all. It's really more about creativity, curiosity, working with the beginner's mind, and getting people to ask the right questions.

From an organizational standpoint, one participant recommended that in building our community of practice, we should “take a look at now. Where we are now, where we're coming from, where we are, where we think we can go.” The concept of empathy was prevalent in the discussion of the inquiry mindset. One participant described following “a particular process, and it all starts with empathy” and encouraging students to “put themselves in someone else's shoes.” Another called empathy a “skill you can learn and get better at” and recognized it as a critical
perspective in responding to student needs by acting on “not what I think they need, but what do they think they need.”

**A Shift in Mindset**

To dig deeper into the topic of mindset and to attempt to answer the third research question regarding how educators describe changes, if any, in their mindset when they engage in design thinking, I shifted the interview from a broader, blue-sky approach to an explicit inquiry into their experience in the design sprint. When asked directly how their mindset changed, if at all, during the 16-week design course, some participants could identify ways in which it had, while others could not. Those who recognized a mindset shift identified changes in three familiar themes: growth, awareness, and empathy.

One participant noted how his idea grew significantly over the course of the sessions, saying, “I was going to do one thing and then changed, and then it evolved during the weeks.” Another identified a similar growth noting his project “moved beyond just refugees attending school, to empowering them.” He said that going through the design thinking process made him realize that it has the power to “open up the doors” so that “the refugees themselves would be able to use bottom-up design processes” to create greater educational and employment opportunities for themselves. Another participant highlighted how, even though he teaches design thinking to students, going through the process himself made him more aware of his own process and how he facilitates it. He noted, “as I'm designing lessons and I'm planning, I'm starting to put my money where my mouth is.” Another reported that the process has led to a mindset shift regarding her “target audience and empathy.” She believes that the design thinking process has helped her “be a better communicator, a better teacher.” She said that, when working with others, “it's a cop-out to say, I just can't understand where they're coming from.”
Other participants didn't recognize a mindset shift in themselves. Instead, they noted that their past experiences had already given them a mindset of growth and empathy. One said, “I already came into the program with that,” and noted that many adults and especially “artists and creatives” have already embraced a growth mindset. Another participant agreed, noting that design sprints such as ours “tend to attract people who are a little bit more open-minded.”

However, when asked if a design thinking process such as the one they went through might positively impact their students' mindsets, the participants all recognized its value. “Absolutely!” one participant said and noted that such innovations were already happening through project-based learning in some schools. Another agreed that such programs could shift the mindsets of students who say, “I couldn't do math. I can't do math. I never will be able to do math.” She viewed such resistance as being rooted in “a fear of embarrassment” that many students experience, especially when they are “still trying to identify themselves, who they are.” Another participant agreed that learners would need to “accept and trust student-centered project-based learning” if a widespread change in education is to take place.

Overall, participants were hopeful that design thinking, project-based learning, and other innovative models have the potential to shift mindsets and transform education. One noted the power of “intense experiences” in education to cause “sudden changes in someone's mental state.” Similarly, another commented that, while it's easy for students and teachers “to get caught up in your own day-to-day drudgery,” innovative education practices have the power to “capture their imagination.” Another participant remarked that human-centered design education provides not only the opportunity to change the minds and lives of students but also “the chance to reverse the current crisis in education and climate and other sustainable development goals” by training the future designers who will “transform policy and practice and empower the excluded.”
Lastly, a participant illustrated the point of mindset shifts resulting from design thinking education by telling the story of a former student who had been “a thorn in [his] side” for always coming in late, picking fights with other students, and rarely completing projects during the three years that he taught her:

She wrote me an email. I'm on the train going into the city, and she had me in tears. “Mr. B.,” she said, “when you gave us that looking and seeing project, I realized that you weren't just asking us to look and see the environment around us, but to really look into what is on the inside of things. And you taught me how to follow our bliss when you introduced us to Joseph Campbell.” And she rattled off about five or six different lessons that I would only hope that kids got. So, she was a prime example of how this kind of model can really change, you know, because I was showing them how to follow a particular process, and it all started with empathy, which is not easy for adolescents.

Chapter Summary

In this chapter, I presented the study findings in relation to the three research questions on (1) obstacles to innovation in education, (2) strategies to overcome the obstacles, and (3) any perceived shift in mindset that occurred in participants over the course of the study. The primary obstacle to innovation identified was an oppressive system characterized by its tradition of white supremacy and its resistance to change. The pervasive system encompasses the further obstacles of inadequate teacher training, outdated instructional models, overly standardized instruction and assessment, and a lack of resources. Strategies to overcome the obstacles to innovation in education focused on the protective nature of a community of practice, especially when the community shares the goal of empowerment by design and supports the development of the mindsets of action, growth, and inquiry. Participants perceived mindset shifts in either themselves or their students in the areas of growth, awareness, and empathy. Participants recognized the fear of failure as a negative mindset that hinders innovative thought and action in their students and others but, for the most part, did not recognize such growth in themselves during the period of the study. In the next chapter, I will explore the implications of the findings.
and how they relate to the literature, the surprises I encountered, and recommendations for further action and inquiry.
CHAPTER 5: CONCLUSIONS

Crossing the Return Threshold

In this final chapter, I will conclude with a brief summary of the study and a discussion of the findings. The summary will include an overview of the problem, purpose, and research questions guiding the study. I will also briefly describe the methodology used and the major findings. The discussion will include how the findings relate to the literature, the surprises I encountered, recommendations for further research, and implications for subsequent action.

A Problem of Practice

The problem spurring this study centers on the growing consensus that the current, dominant education systems no longer meet the needs of learners, if they ever did. Many believe that traditional education systems have become overly standardized and assessment-driven and that fundamental change is needed (Dintersmith, 2018; Goldstein, 2015; Ravitch, 2013; Robinson & Aronica, 2015; Wagner, 2012). Studies indicate that learners are motivated by feeling in control of their education and that motivation diminishes when learner autonomy is stunted by educational systems that value high-stakes standardized tests and one-size-fits-all instruction. Natural curiosity is replaced by a fear of failure, which inhibits learner engagement and renders students uninterested in making a difference in the world (Harris & de Bruin, 2017; Lamb, 2011).

Studies also show that learners’ beliefs regarding their abilities can influence their motivation and, therefore, empowering learners to reshape their mindset can positively impact their motivation and achievement (Lin-Siegler et al., 2016; Rattan et al., 2015; Stock et al., 2018). Growth mindset studies suggest that when learners are encouraged to develop their skills and learn from their mistakes, they cultivate an understanding that intelligence and abilities are
not fixed traits and are more likely to invite challenges and persist in the face of obstacles (Dweck, 2006; Yeager et al., 2016).

The fear of failure is a mindset plaguing not only students but also teachers, administrators, and policymakers (Harris & de Bruin, 2017). Instead of feeling supported, educators feel undermined by systems that discourage innovation. Working in fear-based and compliance-driven systems keeps educators from taking risks and perpetuates an ineffective and inequitable status quo. Furthermore, the lack of agency permeates the entire system, with administrators believing that the power to effect change rests with teachers and teachers feeling powerless to act (Hess, 2015; Thompson, 2018).

Learning to embrace failure as an expected step toward success is a major theme in design thinking, and the prototyping mindset inherent in design thinking may mitigate the fear of failure by focusing on rapid iteration rather than striving for perfection (Carroll, 2015; Carroll et al., 2010; Kwek, 2017; Zielenski, 2017). Instead of being afraid of failure, teachers and students can be emboldened by a mindset of failing forward, meaning that by taking risks, we permit ourselves to use our setbacks as opportunities for growth (Zielenski, 2017). By cultivating a bias toward action in which we embrace the power of prototyping and iteration, design thinking can empower us to make a difference in an increasingly dynamic world (Carroll, 2014).

**Purpose**

The purpose of this action research study was to use the design thinking process to collaborate with a team of eight educators to build a virtual community of practice that supports innovation and inquiry. The participants and I used design thinking and action research as vehicles for meaningful change as we developed strategies to help educators become empowered research practitioners.
Research Questions

The research questions that guided the study are:

1) What obstacles to innovation in education, if any, do educators perceive to be most prominent?

2) What strategies empower educators to create innovative educational solutions?

3) In what ways, if any, do educators describe changes in their mindset when they engage in design thinking?

Review of Methodology

Type of research. In working with the study’s participants, I used qualitative methods drawn from the tradition of participatory action research. With its aim of empowering participants to bring about emancipatory change in a community or system, participatory action research seemed a perfect fit for this study. Its further emphasis on democratizing research by collaborating with participants made it especially appealing. While the varying levels of involvement of the participants in each phase of the study may have kept this research from being considered true participatory action research, the study benefited from the PAR approach. The community of practice we formed created an environment for future research that maximizes participation. By beginning to build a network of educators who share the vision of liberating educators from stifling and inequitable education systems, the study succeeded in encouraging the participants to become research practitioners. We complemented the tenets of action research with the mindset and process of design thinking in a cycle that combines and distills the steps of action research and design thinking into four phases: Question, Imagine, Make, and Share. The design thinking/action research methodology allowed the group to guide the direction of the study as much as possible given the time and other logistical constraints.

Data collection procedures. The eight study participants were from multiple locations throughout the United States and other countries. As such, all data was collected remotely using
video chat, virtual reality, and synchronous and asynchronous collaborative tools. Occurring in four stages that followed the four phases of our design thinking process, data collection began with self-reflection and initial interviews with participants. When we began working as a group, data was collected through our notes and the recordings of our group sessions. Transcripts of our sprint sessions provided data documenting the solutions we created and the processes we used to create them. A second round of individual interviews provided rich data on possible strategies to overcome obstacles to innovation in education and how our mindsets might have evolved during the four-month design course.

**Data analysis techniques.** I used the constant comparative method to collect and analyze data from each phase of our process. During multiple cycles, I used in vivo techniques to code our notes and transcripts and identified potential themes and patterns. I wrote analytic memos and used mind mapping to reflect on the possible implications and then coded and categorized my memos. I used member checking and triangulated the data among the interviews, observations, and the researcher journal to provide further measures of internal trustworthiness. The participants and I used Zoom video conferencing, Google Workspace, and Google Jamboard to collaborate throughout the study and analyze the data as a group. For the second round of interviews, I met most participants in a virtual reality space using VR headsets or a desktop browser.

**Summary of Major Findings**

In this section, I will present the study findings in relation to the literature. I will structure the discussion around the three research questions on obstacles to innovation in education, strategies to overcome the obstacles, and any perceived shift in mindset that occurred in participants over the course of the study. The first research question asked what obstacles to innovation in education, if any, do educators perceive to be most prominent? The primary
obstacle to innovation identified was an oppressive system characterized by its tradition of white supremacy and its resistance to change. While not surprising, it is striking that the impact of oppressive educational systems was represented so clearly in the data. The personal stories of the participants being dispirited by what they perceive to be a system designed to stifle their autonomy and creativity reflected the findings of previous studies (Robinson & Aronica, 2015; Wronoski, 2020). The explicit reference to white supremacy in the participant data supported previous scholarship on the roots of inequity in education, especially in the United States (Goldstein, 2015; Mondale & Patton, 2001). As articulated by education historians, the persistent effects of a system built on white supremacy can be seen in studies that found an association between low socio-economic status and low growth mindset (Claro & Loeb, 2019; Claro et al., 2016; Yeager et al., 2019). The sub-obstacles of inadequate teacher training, outdated instructional models, overly standardized instruction and assessment, and lack of resources were similarly reflected in the literature (Carroll, 2015; Kwek, 2017; Rissanen, 2019; Schmidt et al., 2015; Zielezinski, 2017).

Just as oppressive systems dominated the participant data on obstacles to innovation in education, so did the protective nature of a community of practice pervade the discussion on strategies to overcome the obstacles. In fact, the two—the oppressive system and the community of practice—presented themselves as diametrically opposed forces. The fear and inaction that oppressive educational systems breed discourage community. At the same time, a strong community of practice can begin to change the system by giving individuals the courage to stand up for themselves and others and take bold action. Likewise, overly standardized instruction and assessment are both symptoms and causes of stalled innovation.

The scholarship undergirding this study’s conceptual framework illuminates the findings on communities of practice. The participants suggested that an effective community of practice
should focus on the goal of empowerment by design and support the development of the
mindsets of action, growth, and inquiry. The conceptual framework suggests that the design
thinking process may give educators the courage to innovate because it promotes a growth
mindset of failing forward. Working through the design thinking process, one discovers that
failure is a natural step on the way to a novel solution. The literature suggests that it is not
enough to go on a design journey alone. Learners need to be in an environment in which others
are using a growth mindset to tackle challenges (Yeager et al., 2019). A community of practice
focused on empowerment by design may prove to be the ideal environment for growth and
innovation. Studies suggest that having others on the journey with you, be they teachers,
mentors or peers, is essential for success (Cook & Bush, 2018; Rissanen, 2019).

Similarly, this study's findings support the scholarship behind the design thinking/action
research methodology. The emphasis on reflection that is central to action research was
highlighted in the participants’ experience through comments about being “more intentional
about self-reflection.” Such comments underscore the importance of being aware of one's
process. Furthermore, the action research and design thinking tradition of working as a team has
the potential to break down the artificial barriers that exist between learners and teachers. As
educators develop the metacognitive courage to admit that they are still learners, they can
relinquish some control over the educational process and grant students greater autonomy over
their own learning.

In the tradition of participatory action research, the democratization of inquiry is even
more essential. Whether it was true PAR, the emancipatory nature of our process was
appreciated by the participants. Articulated by one as “a platform for lost voices,” our design
thinking/action research process allowed participants to foreground the aim of empowerment.
The design sprint projects also highlighted learner empowerment. Whether by giving learners in
New York City the power to make connections between disciplines or by allowing learners in Uganda to co-create their school from the bottom up, the participants approached their projects with empathy, a critical principle for both design thinking and action research. While not explicitly articulated, it was strongly implied by participants that in the scope of the hierarchy of oppression, teachers and students are together at the bottom. Of course, students may see the situation differently, but that will need to be explored in future studies.

**Surprises in the Findings**

Four surprises stood out to me in the findings. Two of them were from the first research question on obstacles to innovation. Two of them were from the second research question on strategies to overcome the obstacles. First, it surprised me that the participants viewed a lack of resources as a relatively minor obstacle to innovation in education. Conventional wisdom, and the popular notion of the PTA bake sale, would have you believe that the underfunding of education is a major impediment to progress. While it may be, our findings focused more on the other obstacles. Participants saw the oppressive system, inadequate teacher training, outdated instructional models, and overly standardized instruction and assessment as far more salient obstacles. Perhaps the participants’ school settings were more affluent than average. Especially in the United States, the disparities in school funding from state to state and district to district are well documented. However, even the participants who worked with disadvantaged youth in the United States and refugees in East Africa did not identify lack of funds as a fundamental obstacle. When participants spoke of resource needs, they spoke more of time than money. While one could argue that providing teachers adequate preparation time is also a fiscal problem, the participants saw it more as an issue of principles and priorities.

Another surprise regarding the findings on obstacles was not about what was included but what was missing. While the fear of failure was emphasized in the literature, and while
participants spoke of it generally as a mindset holding back many learners, for the most part, the participants did not personally connect to failure as an obstacle. It is possible that something as personal as a fear of failure might have been difficult for participants to talk about or even recognize in themselves. One could also argue that fear is an implied ramification of an oppressive system.

To try to get to the bottom of the issue, during the second round of interviews, I asked what might be considered a leading question: If you knew you could not fail, what would you do with your project? In retrospect, it feels more like a litmus test because, virtually to a person, the participants rejected the very premise of the question. Whether the participants are naturally fearless people or whether the design thinking process we went through emboldened them to acknowledge failure as something to be expected and not feared, it is clear that, at least by the end of the course, the participants felt empowered to take on the system with their projects.

When it came to the strategies to overcome the obstacles to innovation and education, there were also two surprises. Both were welcome ones. First, I was pleasantly surprised by how the design process and mindsets infused themselves into every aspect of the study. Some of this was by design in that I was using a design process with the participants that I hoped would spur design solutions. Still, I was impressed by the extent to which the participants embraced the design principles and even incorporated them into their projects. By the end of the study, the participants had a deep understanding of how many of the educational systems in place today have been intentionally designed to force students to conform to norms rooted in white supremacy and resistance to change. As a result, the projects that participants undertook during the study were not attempts at change for change’s sake but instead intentional actions to redesign the systems.
Lastly, I was continually surprised by the power of the community. Individually, the participants are remarkable, but collectively, they are unstoppable. Our exploration of expanding the concept of a team from a group working on a project to an interconnected, multinational association of change agents showed us the potential of a community of practice to reshape educational systems. That the community continues and, in fact, is growing even after the course and this study have ended is a testament to its strength.

**Recommendations for Further Research**

As fruitful as this action research has been for the participants and our emerging community of practice, I recognize that it merely scratches the surface of possible inquiry into the topics. Numerous recommendations for future research come to mind from nearly every aspect of the study in the section. Here, I will focus on further inquiry related to the design thinking/action research methodology, the refinement of design thinking's application to education, ways to measure the impact of design thinking on learners, ways to measure mindset shifts in learners, and the further development of communities of practice and virtual communities of practice.

I see it as a strength of the study that the participants came from a variety of educational settings and possessed varying levels of experience. To have a participant in her 20s, another in his 70s, and others in every decade in between provided a more diverse set of perspectives than if the participants were all pre-service teachers, for example. However, I can imagine future studies with more homogeneous participant groups. A group of K-12 teachers would likely lead to different findings than a group from post-secondary. Conversely, as diverse as our participant group was in age, experience, and setting, it lacked diversity in race and ethnicity. Subsequent research with a group of participants selected more purposefully with racial and ethnic diversity in mind would surely produce different and informative results. Lastly, while this research
centered on the experience of educators working through the design thinking process, future studies working with primary and secondary students would prove illuminating.

Further research on the use of design thinking education will be necessary if it is to have the impact on schooling and learning that I hope it will. The definition of design thinking seems to be coalescing, but there are still numerous models in use. Rather than a weakness, I view the variety of design thinking models, each tailored to a specific setting or purpose, to be a strength of the field. Still, studies comparing the various models would only strengthen our understanding of how design thinking can be used with learners. For example, the four-phase model we used for this study has its roots in the hero's journey as articulated by Joseph Campbell. Further scholarship on the journification of design thinking may find ways to make the process more accessible to some learners.

Future research measuring the effects of design thinking on learners is also necessary. Measuring impact was beyond the scope of this qualitative study, but future studies might use quantitative methods to expand on previous efforts to measure curiosity, creativity, and collaboration, all important elements of design thinking. Continuing efforts to measure the effects of mindset interventions on learners may prove key to making design thinking education more mainstream. As suggested by previous research, and by some of this study’s participants, pre and post-tests that measure learners’ growth mindsets before and after engaging in the design thinking process may provide convincing evidence for school administrators and policymakers of design thinking’s efficacy in shifting mindsets (see Appendix F).

Lastly, further research into the formation of communities of practice, especially as it relates to this study's design thinking/action research methodology may be worthwhile. By their very nature, design thinking and participatory action research are collaborative endeavors necessitating a team. Forming this team with shared guiding principles and the intention of
continued collaboration could move them from mere workgroups to true communities.

Additional research into the formation and function of virtual communities of practice could be especially helpful in the new world of remote work and learning that we find ourselves in. Even when the current pandemic ends, the convenience, cost savings, and reduced carbon footprint of meeting remotely will likely mean the trend is here to stay. With the growth of the metaverse—novel ways and places to connect with people from around the world while not leaving your home—the popularity of virtual communities of practice is sure to expand.

**Implications for Action**

With this action research study being the intended basis for a social business, the question of future action is not a theoretical one. Since the study ended and while I've been writing up the findings, the action that started with this research has continued. As such, the implications in this section are both my own personal and professional goals and suggestions for others who might join the cause.

First and foremost is the continual growth of the community of practice. In our case, we have named our community Ensō. The term comes from Zen Buddhism and translates as the circle of togetherness. In building our Ensō circle, we have realized that the community will in fact consist of multiple sub-communities that share the same guiding principles but have their own specific emphases. Some of these sub-communities are focused on different environments where learning happens. In keeping with our journified curriculum, we call these learning environments Basecamps, and we currently have four. Basecamp Built Environment is focused on issues of the constructed world, with cities and the accelerated movement of people to them being the dominant example. With Basecamp Great Outdoors, we recognize that much of the best learning comes from time spent in nature. Basecamp Sim Worlds identifies venues such as museums, zoos, and theme parks that simulate learning environments we may not otherwise have
Lastly, Basecamp Media Worlds acknowledges the learning that happens from the mediated experiences of books, movies, TV, video games, VR, and others. In addition to these domains where learning can take place, other sub-communities of practice could include specific projects that Ensō supports such as the school of design for refugees in Uganda.

While the emerging technologies make it possible to form a virtual community of practice with global participation, we do not want to lose sight of the benefits of face-to-face interaction. To this end, when it is safe to do so, future action should not neglect in-person gatherings. In January of 2022, we brought a group that included four of this study’s participants to the World Expo in Dubai. Finally meeting in person with people I have known only virtually was a remarkable experience. We are planning future in-person gatherings in Los Angeles for Basecamp Media Worlds, Orlando for Basecamp Sim Worlds, and the Apostle Islands of Lake Superior for Basecamp Great Outdoors. In an effort to address equitable access to these events, as well as the significant carbon footprint of air travel, for Basecamp Great Outdoors, we are promoting the practice of bioregionalism, in which people around the world organize and gather for local nature experiences at roughly the same time and then come together virtually to share stories of their separate experiences.

Future action must also include spreading the firsthand experience of the design thinking process by continuing to offer our design courses. We plan to offer 10-week courses, which function as both a seminar and a practicum, in what we call the Kairos series. The series includes an introductory Pathfinder Sprint followed by the more advanced Design Sprint and Launch Sprint. The courses offer the opportunity for people interested in the Ensō community of practice to experience our learning principles and practice the design process by taking on a project of personal interest to them that will make a difference in the world.
Another area for further action is print and video production. While we will pursue academic publication, we will also produce books and videos that have the potential to reach a wider audience. In much the same way that Carol Dweck felt that she had been working in secret when publishing solely in academic journals before her book on growth mindset became a bestseller, we do not want to limit our reach to those who are already invested in design thinking and other innovative educational practices. We are working to establish an Ensō Media arm of our community that would include book publishing. Our first book will be one that a study participant worked on during the design course. Recognizing that people are increasingly consuming content in the form of short videos, we are working to build a video production subcommunity that can create brief educational and promotional videos suitable for social media platforms such as YouTube, Instagram, TikTok, and whatever becomes popular next.

As we grow as a community of practice, we will do so being guided by principles reflected in the study’s findings. Above all, we will keep a steadfast focus on diversity, equity, and inclusion. Recognizing that the strength of our community of practice is in its diversity, we will design practices that promote equitable participation and aim to dismantle structural racism and white supremacy. To do so, we will maintain a decentralized view of leadership that respects the fact that everyone has their own individual interests and priorities within the broader community of practice. Ownership of any project will remain with those doing the work rather than any imposed organizational hierarchy. In this way, decision-making will remain as local as possible. This decentralized organizational structure mirrors the educational philosophy of maximum learner autonomy that we promote and is reflected in the blockchain technology explored by one of the study participants. By following these principles, we intend to be always future-oriented. We are not merely designing educational strategies for today. We strive to develop solutions for tomorrow.
Conclusion

I have rewritten the first sentence of this dissertation at least a dozen times since I began my doctoral journey three and a half years ago. Here it is again, just in case you forgot it: “With over 72 million views, the late Sir Ken Robinson’s “Do schools kill creativity?” is the most-watched TED talk ever.” I am not unhappy with the sentence, nor do I feel that it needs wordsmithing. It is that every time I return to it, the sentence is hopelessly out of date. When I began thinking about what problem I wanted to tackle with my research, Sir Ken Robinson’s famous Ted Talk was already the most-watched ever with 56.7 million views. However, when I checked again a few months later, the number of views had risen to 58 million. A year later it was 62.5 million. As I am writing this it has been viewed more than 72 million times, and as you're reading this, you can be certain that the number has gone up.

So, what's happening here? It is not just that Sir Ken, who passed away in August of 2020, was a tremendous public speaker with the perfect mix of erudition, inspiration, and self-deprecating humor. It is that his talk struck a nerve. Millions of people have heard him say that creativity is as important in education as literacy and have nodded along in agreement. The problem is that those millions have mostly been watching at home alone in front of their screens. This action research study was an attempt to bring together those inspired by Robinson's words and convinced that the time is now for change in education.

Through action research and design thinking, the study participants and I have begun to form a community of practice focused on the ideal of empowerment by design. We nine were just the beginning of this community. Already along our journey, we have encountered hundreds of like-minded partners, mentors, and sponsors who share our drive to transform education. Over the years, those hundreds will become thousands, the thousands will become millions, and someday we will achieve the admittedly grand goal of reaching one billion learners.
Before taking on this study, I only half believed our ability to reach so many. After working with these passionate educators, seeing their excitement about the power of design thinking and action research, and recognizing the impact that each of our projects can have if we continue to empower one another through this community, I now see a billion as inevitable.
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APPENDIX A: HARRIS CREATIVITY INDEX

Strategy 1 - Creative approaches/teacher development
Strategy 2 - Cross-curricular collaboration
Strategy 3 - Allowing students to lead
Strategy 4 - Real-world skills and assessment
Strategy 5 - Creative partnerships/links with community
Strategy 6 - Better resources

Through these areas of professional development, school leaders should commit to ongoing development serving the following three core foci:

Focus 1 - Creative environments
Focus 2 - Assessing creative processes and products
Focus 3 - Creative industry partnerships

(Harris & de Bruin, 2017)
(Razzouk & Shute, 2012)
APPENDIX C: INTERVIEW QUESTIONS

Primary Questions for First Interviews

1. Tell me a little about your journey to your current position.

2. What does innovation look like at your school site?

3. How have you seen innovative educational practices affect student engagement?

4. Does design thinking or action research enter into the conversation around innovation at your site? If so, could you give me some examples?

5. Based on your experience, what keeps more teachers from implementing innovative practices?

6. What else would be useful to know about your school site that we have not had a chance to talk about?

Secondary Questions (if applicable and time permits)

7. How have you seen the practice of design thinking affect student curiosity and engagement?

8. How might we measure the impact of design thinking on student learning?

9. What are some challenges to implementing the design thinking process with students?

10. Is there anything else you would like to add?

Other Questions

Additional questions on the topics above may emerge as the interview directs.

Primary Questions for Second Interviews

1. Describe a classroom innovation you are proud of.

2. What classroom innovation would you try if you knew you could not fail?

3. If the innovation succeeded, what would it look like?
4. What would students be missing out on if you never tried your innovation?

5. What small step can you take today to begin creating your innovation?

6. In what ways, if any, have you noticed your mindset shifting while working through the design thinking process?

7. Is there anything else you would like to add?

Other Questions

Additional questions on the topics above may emerge as the interview directs.
## Observation Protocol - Online Collaboration

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### Activities & interactions

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BENERD COLLEGE RESEARCH SUBJECT’S CONSENT TO PARTICIPATE IN RESEARCH

FAILING FORWARD: CLASSROOM INNOVATION AND INQUIRY THROUGH DESIGN THINKING AND ACTION RESEARCH

Name of Lead Researcher: Cory Rayala, Co-Researcher: Dr. Brett Taylor

You are being invited to participate in a research study, and your participation is entirely voluntary.

Purpose of Research. The purpose of this action research is:
To use the design thinking process to collaborate with a team of educators to build a virtual community of practice that supports innovation and inquiry.

Duration of Participation. The expected duration of participation in this study will be approximately four months.

Research Procedures. If you decide to participate, you will be asked to reflect on your design thinking process through interviews, focus groups, and brief personal reflections. As this study aspires to be participatory action research, you will also be invited, though not required, to participate in the analysis of the data we collect.

Foreseeable Risks. There are no anticipated risks beyond those experienced in everyday life.

Benefits. There are no direct benefits to participating, but you may experience (1) exploring the use of design thinking and action research as vehicles for meaningful change and (2) developing resources to help educators become empowered research practitioners.

Alternative Procedures. There are no alternative research procedures for this study.

CONFIDENTIALITY
We will take reasonable steps to keep confidential any information that is obtained in connection with this research study and that can be identified with you.

Measures to protect your confidentiality are:

All records will be kept in secured locations, and password protection will be a requirement for any data stored online. Participant names, sites, and any other identifying information will be pseudonymized. No material will correlate the consent form to the research data.
Upon conclusion of the research study, the data obtained will be maintained in a safe, locked or otherwise secured location and will be destroyed after a period of three years after the research is completed.

PARTICIPATION
You were selected as a possible participant in this study because you are an education innovator who has demonstrated expertise, creativity, and enthusiasm in undertaking the action of creating a virtual community of practice that supports innovative educational strategies.

We expect to have 7 to 15 participants take part in this study. Please feel free to ask any questions you may have.

Your decision whether or not to participate will involve no penalty or loss of benefits to which you are otherwise entitled. If you decide to participate, you are free to discontinue participation at any time without penalty or loss of benefits to which you are otherwise entitled.

EXPERIMENTAL PROCEDURES
None

COLLECTION OF INFORMATION OR BIOSPECIMENS
No identifiable private information or identifiable biospecimens will be collected.

UNIVERSITY CONTACT INFORMATION
I am the lead researcher in this study, and I am a doctoral student at the University of the Pacific, Benerd College. This research study is part of my dissertation for the degree of Doctor of Education in Leadership and Innovation.

If you have any questions about the research at any time, please contact me at (310) 497-5020 or by email at c_rayala@u.pacific.edu, or Dr. Brett Taylor at btaylor@u.pacific.edu.

If you have any questions about your rights as a participant in a research project or wish to speak with an independent contact, please contact the Office of Research & Sponsored Programs, University of the Pacific at (209) 946-3903 or by email at IRB@pacific.edu.

NO COMPENSATION & NO COMMERCIAL PROFIT
No compensation is being offered for participation in this study.

ACKNOWLEDGEMENT AND SIGNATURE
I hereby consent: (Indicate Yes or No)

To be audio and video recorded during this study.
___Yes    ___No

For such audio and video records resulting from this study to be used for solely for the purpose of data collection, coding, and analysis:
___Yes    ___No
For my identity to be disclosed in written materials and oral presentations resulting from this study:
___Yes  ___No

You will be given a copy of this form to keep.

Your signature below indicates that you have read and understand the information provided above, that you have been afforded the opportunity to ask, and have answered, any questions that you may have, that your participation is completely voluntary, that you understand that you may withdraw your consent and discontinue participation at any time without penalty or loss of benefits to which you are otherwise entitled, that you will receive a copy of this form, and that you are not waiving any legal claims, rights or remedies.

Signed: ________________________ Date: __________________________

Research Study Participant (Print Name): ____________________________________

Researcher Who Obtained Consent (Print Name): ____________________________
APPENDIX F: MINDSET ASSESSMENT

1. No matter how much intelligence you have, you can always change it a good deal.
2. You can learn new things, but you cannot really change your basic level of intelligence.
3. I like my work best when it makes me think hard.
4. I like my work best when I can do it really well without too much trouble.
5. I like work that I'll learn from even if I make a lot of mistakes.
6. I like my work best when I can do it perfectly without any mistakes.
7. When something is hard, it just makes me want to work more on it, not less.
8. To tell the truth, when I work hard, it makes me feel as though I'm not very smart.

Each statement is judged on a six-point Likert scale as described below.

A. Disagree A Lot
B. Disagree
C. Disagree A Little
D. Agree A Little
E. Agree
F. Agree A Lot

(Assess Your Mindset to Begin Your Journey Today, 2015)