2021

Exploring How Principals Make Sense as They Implement Reform

Melissa Renee Beattie
Walden University

Walden University

College of Education

This is to certify that the doctoral study by

Melissa Renee Beattie

has been found to be complete and satisfactory in all respects,
and that any and all revisions required by
the review committee have been made.

Review Committee
Dr. James Bailey, Committee Chairperson, Education Faculty
Dr. Kathleen Kingston, Committee Member, Education Faculty
Dr. Cheryl Burleigh, University Reviewer, Education Faculty

Chief Academic Officer and Provost
Sue Subocz, Ph.D.

Walden University
2021

Abstract

Exploring How Principals Make Sense as They Implement Reform

by

Melissa Renee Beattie

MA, Walden University, 2007

BA, California Polytechnic State University, San Luis Obispo, 2000

Project Study Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Education

Walden University

November 2021

Abstract

School principals serve a critical role with staff in leading change at their schools. School districts increasingly seek to implement system-wide reforms to improve academic achievement in all schools under their jurisdiction; yet inconsistency in application is often a problem. In a K–12 public school district in California's Central Valley, a district-driven, science technology engineering and math (STEM) curriculum reform initiative is being implemented inconsistently. The research questions guiding this study asked how elementary school principals make sense of the content of a district-driven, STEM reform initiative to improve overall student academic achievement and how these principals use their interpretations of the initiative to lead such curriculum implementation. This qualitative study included analysis of data from interviews with and the review of archival documents of six elementary school principals of K–5 and K–8 schools charged with implementing the initiative at their school. The data were transcribed, coded, and analyzed for emerging themes using Weick's theory of sensemaking and components of Fullan and Quinn's coherence framework. Findings indicated a need for a common vision and consistency in enacting common actions to achieve the goals of the STEM reform initiative. Implications for positive social change include a better understanding for elementary school principals and district central office leaders regarding what principals need to make sense of to implement reform initiatives focused on deep learning for all students. The results support both district central office leaders and elementary school principals to be better equipped to identify effective processes that make sense of educational reforms, thus increasing their effectiveness as change agents to positively impact student learning and achievement within their local school system.

Exploring How Principals Make Sense as They Implement Reform

by

Melissa Renee Beattie

MA, Walden University, 2007

BA, California Polytechnic State University, San Luis Obispo, 2000

Project Study Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Education

Walden University

November 2021

Dedication

This is dedicated to my amazing, loving family. To my husband, Shannon Beattie, who is my rock. You have always believed in me and have made it possible for my crazy dreams to become reality. There is nothing I cannot do with you by my side. To my girls, Catherine and Elizabeth, for not only understanding that I was busy doing schoolwork, but for also supporting and cheering me on. I love you super much!

Acknowledgments

Thank you to the many people who have supported and guided me throughout this project. To my chairs, Dr. James Bailey and Dr. Kathleen Kingston, thank you for your consistent support, guidance, and encouragement. To my colleagues, who became friends, you supported me through this process by being a sounding board, a cheering section, and a support system, my sincerest thanks and gratitude. I look forward to supporting each of you on this journey one day. To all of the women in leadership that have come before me, thank you for paving the way. Thank you to my best friend, Sarah, who is exactly what a best friend should be. Thanks to my two amazing daughters who supported me in this process and who I hope one day follow their own dreams. And to my husband, thank you for taking on all of the household chores – and the occasional reading and rereading of many drafts – so that I could make this dream a reality.

Table of Contents

Section 1: The Problem

The Local Problem

Valley Unified School District (VUSD), a pseudonym for the school district in this study, is a K–12 public district in California's Central Valley. Like many districts in the nation, VUSD is faced with increasing pressure to transform the public school system so as to improve overall student academic achievement (see Ganon-Shilon et al., 2020). As a part of its efforts, VUSD applied for and received an Education Innovation and Research (EIR) early phase grant award from the U.S. Department of Education to develop and implement a preK–12 integrated science, technology, engineering, and math (STEM) pathway for all students within the district over the course of 5 years. However, VUSD has experienced inconsistent site implementation, led by the K–5 and K–8 district elementary school principals of this district-mandated initiative.

In their EIR grant proposal, VUSD described their STEM reform initiative as the development and implementation of STEM curriculum with an emphasis on core curricular linkages. Engineering and computer sciences were integrated into the core curriculum for interdisciplinary learning and mastery of state standards. Core curriculum refers to English language arts and mathematics content. Integrating science, engineering, and computer sciences serves to increase opportunities for all students and teachers to engage in problem- and project-based learning that is academically rigorous and that builds an understanding of STEM career options. The goal of the grant was to build the professional capacity of teachers and principals to support interdisciplinary STEM

instruction and to implement project-based learning that will increase student interest in STEM, particularly students from underrepresented groups within STEM professions.

Existing local data from the grant implementation indicators suggested that the STEM reform initiative has been inconsistently implemented even though consistent implementation is required by the grant. Grant indicators included each site having a site implementation team, providing professional learning to teachers, and conducting instructional rounds to monitor implementation of the integrated STEM curriculum. Only two of the nine elementary school principals responsible for implementing the STEM reform initiative reported having a site implementation team and provided evidence of site professional learning for teachers and activities demonstrating site implementation, including instructional rounds during the 2019–2020 school year. In addition, instructional rounds data that the district elementary school principals collect when observing classroom instruction in STEM were not consistently collected or tracked by content at any of the school sites. In 2020, VUSD submitted a proposal for a second phase EIR grant that detailed the need to train and incentivize principals. In the mid phase EIR grant proposal, VUSD described the district's need to make significant improvements to elementary school principals' instructional leadership, demonstrating the locally identified gap in practice with the grant's requirements.

VUSD has persistently low academic achievement. Of its students, 59% live in poverty, 26.9% are English language learners, and only 29% are proficient in math (which is 11% below the state average) and only 38% are proficient in English language arts (which is 13% below the state average), according to the 2019 California Assessment

of Student Performance and Progress (CAASPP; California Department of Education, n.d.). The district-driven reform was focused on implementing an integrated STEM curriculum to fulfill a growing need for high-quality STEM instruction in the United States that improves student achievement outcomes (see Noonan, 2017).

Rationale

The U.S. Department of Education (2020) designed the EIR program to support field-initiated innovations to generate solutions to persistent educational challenges. In the United States, policymakers view proficiency in STEM fields as vital to the nation's economic growth and, as a result, emphasize student learning in STEM fields (Noonan, 2017; White et al., 2019). Effectively implementing an integrated STEM curriculum district-wide can have far-reaching implications for schools throughout the nation (White et al., 2019). The 2018 report from the Committee on STEM Education of the National Science and Technology Council (2018) articulated a national vision that gives all students access to high-quality STEM education and positions the United States to be a global leader in STEM innovation and employment. The America Competes Reauthorization Act supports a 50% increase in STEM experiences for students and an increase of 1 million students obtaining degrees in STEM fields over the next 10 years (Granovskiy, 2018). Despite the growing need for high-quality STEM instruction, the 2018 National Assessment of Education Progress mathematics assessment showed a slight decline in math scores, and the 2019 trends reported in the International Mathematics and Science Study 2019 report indicated stagnant scores for low-

socioeconomic status students and declines in scores of high-socioeconomic status students (Broer et al., 2019; White et al., 2019).

Since A Nation at Risk (National Commission on Excellence in Education, 1983) was released declaring the nation's public-school system a failure, schools and districts across the United States have continually sought solutions to close the achievement gap for all students. Yet, large-scale reform movements that improve teaching and learning are seldom implemented (Fullan & Quinn, 2016). After decades focused on the academic proficiency demands of the No Child Left Behind Act in 2001, and the recent shift to a growth model under the Every Student Succeeds Act (ESSA) in 2015, public school districts across the United States are now seeking systemic, long-term changes that can result in increased academic achievement for every student (Honig et al., 2017). District central office leaders, such as associate superintendents and district-level directors, once serving as managers of basic functions, are now instrumental in focusing direction to implement coherent systemic reform to improve academic outcomes (Honig et al., 2017), and the role of the principal is now increasingly complex and difficult because elementary school principals are charged with leading the instructional vison of the school; maintaining a safe learning environment; building relationships with the community; and ensuring the school follows local, state, and federal policies (Lavigne & Good, 2019; Spillane & Kenney, 2012). Attempts to improve student academic outcomes through reform efforts often fail because they focus on what Fullan and Quinn (2016) called the wrong drivers for whole system reform—accountability, individual leadership, technology, and fragmentation—that fail to build coherence around the desired changes.

The purpose of this study was to explore how district elementary school principals' sensemaking (i.e., the cognitive processes a person employs to makes sense of a new situation or event) influences their implementation of a STEM reform initiative within the school district to improve student academic achievement overall. VUSD defined its persistently low student academic achievement in the EIR grant proposal by reporting its stagnant academic achievement test scores on the CAASPP in English language arts, math, and science, which were below the county average, as well as the low number of students enrolled in International Baccalaureate and Advanced Placement courses in the district's high schools. The district elementary school principals' ability to lead the implementation of the reform initiative impacts the implementation in the classroom, and principal sensemaking is essential to the implementation process (Shaked & Schechter, 2017). Exploring the ways in which district elementary school principals' sensemaking influences their implementation of the initiative's goals to improve achievement has the potential to increase their ability to consistently implement the STEM reform and improve student academic outcomes.

Definition of Terms

District central office leaders: The "executive level staff—those reporting directly to superintendents, deputy superintendents, or the equivalent" (Honig, 2012, p. 734). This includes the superintendent, associate superintendents, directors, and coordinators who work at the district office. The district central office leaders are responsible for the professional learning, support, and guidance of the district elementary school principals.

Sensemaking: The cognitive process individuals use to make plausible sense of a situation or to understand situations or events that are out of the ordinary (Brown et al., 2015; Ganon-Shilon & Schechter, 2019). The act of making sense is usually guided by plausibility over accuracy (Weick, 1995). For district elementary school principals enacting a STEM reform, sensemaking is the process they use to create and disseminate information to give meaning and direction to the school staff.

STEM reform initiative: For the purposes of this study, the goal of the initiative is to integrate science, technology, engineering, and math into the core English language arts curriculum. The intent is to place STEM learning into the core instruction for all students as well as positively affect student attitudes and confidence in STEM subjects and improve student achievement (White et al., 2019).

Significance of the Study

STEM reform initiatives are implemented with the thought that including STEM materials in the core curriculum will improve overall student academic achievement. By exploring the way district elementary school principals participate in such reform, this study contributes to the current understanding of the obstacles to reform and the path to success. Knowing how elementary school principals make sense of a reform and how this sensemaking influences how they implement the reform at their site will affect student achievement (Schechter & Shaked, 2017) and future access to STEM-related jobs.

Previous research has shown that the site principal has a significant impact on reform implementation, and effective school leaders can achieve coherence within the reform initiative (Lawson et al., 2017; Spillane & Kenney, 2012). While elementary

school principals can have a positive impact on school reform efforts, researchers have suggested further research is needed to explore the role of their sensemaking, experiences, and interpretations during reform implementation (Ford et al., 2020; Ganon-Shilon & Schechter, 2017a, 2019). Understanding how district elementary school principals make sense of the STEM reform and how this sensemaking influences their actions could provide insights into the elements needed to implement STEM reform with their schools successfully.

Research Questions

In this qualitative project study, I explored how district elementary school principals' sensemaking influences the implementation process of a district-driven, STEM reform initiative to improve persistently low student achievement. The focus of this project study was the district implementation of a STEM reform initiative and the district elementary school principals within this partner district who are leading the implementation of integrated STEM curriculum at their individual school sites. The following research questions guided this study:

1. How do elementary school principals (i.e., K–5 and K–8) in VUSD make sense of content of a district-driven, STEM reform initiative to improve overall student academic achievement?
2. How do elementary school principals (K–5 and K–8) in VUSD use their interpretations of the initiative to lead such curriculum implementation?

Review of the Literature

When faced with a district-mandated curriculum reform to improved academic achievement, elementary school principals must make sense of the initiative to create and participate in its implementation process. The conceptual framework of this qualitative study was based on Weick's (1995) theory of sensemaking in organizations. Sensemaking is a cognitive process that individuals and groups actively engage in when faced with new information that is inconsistent with their prior beliefs (Weick, 1995). The literature review continues with a synthesis of the research focused on the challenges district and site leaders face when in implementing education reform; the role of district central office leaders and elementary school principals during reform implementation; and effective education reform implementation practices.

Literature Search Strategy

This literature review includes books and peer-reviewed journal article retrieved from databases accessed through the Walden University Library, including ProQuest Central, SAGE Journals, Taylor and Francis, and Emerald Publishing. I conducted initial searches using the EBSCO search engine on the Walden University Library website to access articles on sensemaking. In subsequent searches, additional key terms were used based on previous searches and peer-reviewed journal articles found. Key word search terms used included *sensemaking, sensemaking theory, organizational sensemaking, central office, district office, leadership, innovation, reform, reform implementation, principal, site leader, motivation, change agent, systems, coherence, crafting coherence, reform coherence,* and *educational change.*

Conceptual Framework

The theory of sensemaking provided the framework for this study, highlighting the process that elementary school principals use to make meaning out of new information or experiences; sensemaking is influenced by past experiences and prior knowledge (Weick, 1995). How individuals see the world is a result of their sensemaking as Weick (1995) stated, “People make sense of things by seeing a world on which they already imposed what they believe” (p. 15). While there is no one definition of sensemaking, researchers have generally defined it as the process by which individuals make plausible sense of a situation or work to understand situations or events that are out of the ordinary (Brown et al., 2015; Ganon-Shilon & Schechter, 2019; Holt & Cornelissen, 2014; Schechter & Shaked, 2017). Weick delineated sensemaking as an activity or process separate from interpretations. Weick et al. (2005) further defined sensemaking as how people create, interpret, and enact meaning with others and situated the process as occurring before interpretation. Where interpretations can be changed or modified, sensemaking differs significantly because questioning the way people make sense of the world has drastic implications on their self-perception (Weick, 1995). For a person to question their sensemaking is to question their sense of the world.

For elementary school principals engaging with externally driven reform efforts, sensemaking is how they shape the new reform, giving it meaning that aligns with their sense of self and their sense of the school culture and context (Ganon-Shilon & Schechter, 2019). Elementary school principals construct the mental model that frame the new reform demands within their current context and then communicate these

expectations to their staff. Transitioning decisions from thoughts to action clarifies the situation and narrows the possibility of options for how principals implement the reform at their schools. Ganon-Shilon and Schechter (2019) argued that because principals' sensemaking determines their decision to implement reforms and to what level, education reform efforts are a top-down, bottom-up collaboration. District central office leaders, including the superintendent, associate superintendent of educational services, and educational services directors, who coordinate efforts through clear communication and trust can create space for elementary school principals to implement the reform within their individual school contexts.

While much of what occurs in organizations like school districts is routine, district central office and school leaders need to give their full attention to situations where change is expected and needed (Ganon-Shilon & Schechter, 2019). Elementary school principals need to make sense of the changes within their current realities, which is why reforms demand a high level of attention because they disrupt principals' routines or beliefs (Weick et al., 2005). Sensemaking is about balancing the complexity of thinking to develop a plausible story and simple actions (Colville et al., 2012; Weick et al., 2005). Given the critical role of elementary school principals in reform implementation, their ability to make sense of the change is essential to reform efforts. Sensemaking ultimately determines a principal's belief in the plausibility of implementing the reform within the local context, and this determines their motivation to implement the reform and the actions they take to do so. A principal's sensemaking

determines to what degree they will focus direction, cultivate collaborative cultures, deepen learning, and secure accountability around the new reform.

Schechter and Shaked's (2017) findings indicated that high school principals value having discretion to adjust the reform to their school context and their teachers' needs. Yet, little research exists regarding elementary school principals' sensemaking, experiences, and interpretations during reform implementation processes (Ford et al., 2020; Ganon-Shilon & Schechter, 2017a, 2017b; Ganon-Shilon et al., 2020). Principals engage in a sensemaking process when enacting educational reforms, translating new ideas and expectations into practice; however, this process is often overlooked and in need of further research.

Review of the Broader Problem

In the remainder of this literature review, I provide information about the concept of educational reforms that often target curricular, instructional, and technology improvements within the educational setting, the district central office leader's role in supporting elementary school principals with reform implementation, the role of the principal in implementing reforms, and the need for coherence in reform implementation. It is evident from the literature that the key to reform efforts is the principal, who serves as the lead change agent, impacting student achievement outcomes both directly and indirectly through their decision making (Ganon-Shilon & Schechter, 2017a; Tamir & Grabarski, 2020; Werts & Brewer, 2015). While elementary school principals serve as change agents in the implementation of education reforms (Acton, 2021; Schechter & Shaked, 2017; Spillane & Kenney, 2012), there is little known about

elementary school principals' sensemaking processes when interpreting and implementing educational reforms at their schools (Ganon-Shilon & Schechter, 2019; Shaked & Schechter, 2017). The ways in which elementary school principals implement reforms aimed at improving student achievement are directly influenced by how the principals make sense of the reform in front of them (Pyhältö et al., 2018).

Reform Within the Educational Organization

Beginning with the No Child Left Behind Act in 2001 and then the ESSA of 2016, education and reform have become synonymous in the U.S. educational system. Educational leaders face increasing pressure to engage in continuous improvement efforts through reform implementation that is concentrated on improving teaching and learning (Shaked & Schechter, 2017; Tamir & Grabarski, 2020).With efforts to improve academic achievement monitored by standardized testing and accountability systems, reform efforts primarily address curriculum and instructional changes. Spillane and Kenney (2012) asserted that there is some evidence that student achievement has increased due to high stakes testing, though the evidence to support this is weak.

Corsi (2020) argued that "education means change – changing people" (p. 688)., which implies that education in and of itself demands constant reform through ongoing change, adaptation, and improvement. Those working in educational institutions seek to be lifelong learners, which makes change the priority for educational leaders. Therefore, educational institutions are synonymous with a never-ending cycle of reform, signifying those reforms should be valued for how they impact people rather than for defined successes and failures (Corsi, 2020). Corsi concluded that reform should be studied as a

sociological phenomenon to understand educational reform's motivating social conditions. If the act of reform is to change people, the act of sensemaking is central to understanding how individuals try to make sense of reforms and ultimately influence the reform efforts.

The Role of the District Central Office Leaders During Reform Implementation

District central office leaders, like superintendents, associate superintendents, and directors, traditionally serve as managers focused on operational duties to support school infrastructure district-wide while reform implementation responsibilities are left to individual district elementary school principals (Ford et al., 2020; Johnson & Chrispeels, 2010). After decades of research focused on school-level reform, recent research has suggested that district central office leaders can bring coherence to the district system by providing robust and coordinated instructional support to district principals under their jurisdiction (Ford et al., 2020; Honig, 2012; Honig & Rainey, 2015, 2020; Johnson & Chrispeels, 2010; Leithwood, 2013).

The relationship between the district central office and elementary school principals is critical for sustained improvement of student achievement. Traditionally, elementary school principals' performance has been monitored through accountability measures like student achievement scores and graduation rates (Honig et al., 2017). More recent efforts from district central office leaders have concentrated on how principals are learning to be more effective. Ford et al. (2020) indicated that district central office leaders can support elementary school principals in building coherence in school reform efforts by helping principals develop self-efficacy. Honig (2012) suggested five strategies

that district central office leaders should employ to help build elementary school principals' self-efficacy, stating that central office leaders should (a) engage in the work collaboratively alongside the elementary principal, (b) differentiate support for principals based on individual principal need, (c) model practices, (d) use common tools to support coherence for the new learning, and (e) broker the relationships between the central office and site leaders to buffer or bridge resources. A coordinated set of strategies is essential for building relationships that assist elementary school principals in meeting the demands as change agents responsible for implementing educational reforms at their schools (Fullan, 2019; Honig & Rainey, 2015; Mania-Singer, 2017).

Researchers continue to investigate why many reforms do not create lasting change despite promising findings that the district central office leaders can effectively serve as change agents to enact effective reforms that improve student achievement (Acton, 2021; Hargreaves & Goodson, 2006; Johnson & Chrispeels, 2010), and principals feel more successful as change agents when there is a system wide commitment to the desired educational change (Acton, 2021; Honig, 2012). However, elementary school principals are seldom provided a clear vision or the support they need from district central office leaders to effectively lead change (Fullan & Kirtman, 2019). Farrell and Coburn (2017) cited district central office leaders as responsible for designing local reform efforts while simultaneously implementing state- and federal-mandated reform efforts. District central office leaders should support elementary school principals as they make vital decisions on improving academic achievement (Honig & Rainey, 2015). Supporting elementary school principals necessitates that district central office

leaders communicate clearly and build trust with the school site leaders (Lawson et al., 2017). Consequently, district central office leaders must understand how district elementary school principals engage in sensemaking and how sensemaking influences principals' motivation to implement reforms and to what degree. Research has shown that district central office leaders can play a critical role in building coherence for system wide reform efforts; however, little is known about which district central office leaders' practices help develop principal efficacy during the implementation of new educational reforms (Ford et al., 2020).

The Role of the Principal During Reform Implementation

Educational reforms have increased the demands on the role of the principal, who is responsible for the day-to-day operations, student academic achievement, and the increasing responsibilities of reform implementation at the site level. The constant push for educational reform with its overload of initiatives and compliance mandates has left elementary school principals feeling overwhelmed, uncommitted, and unmotivated to implement any one reform as initiatives come and go (Wang, 2020). Despite the unyielding focus on educational reform, reforms have rarely been implemented as intended (Ganon-Shilon et al., 2020).

With increasing demands and the growing complexity of the position, principals at all levels are experiencing burnout, yet what defines an effective principal may be the cause of burnout (Wang, 2020). Oplatka (2017) identified this contradiction as a paradox explaining "that these work habits, and especially externally imposed requirements, tend to increase principal workload, and, in turn, cause principals to be susceptible to burnout

and health problems" (p. 565). The California Professional Standards for Education Leaders described an effective principal as one whose work habits include developing and implementing a shared vision with the staff and school community, providing instructional leadership, managing the learning environment, engaging families, and the community, managing external contexts and policy, and maintaining high levels of ethics and integrity (Commission on Teacher Credentialing & California Department of Education, 2014). Studies focused on principal burnout and workload have indicated that when principals perceive tasks as significant to teaching and learning, they found the work meaningful and do not attribute the additional tasks to workload (Bauer & Silver, 2018; Oplatka, 2017; Reid, 2020). Fullan and Quinn (2016) argued that for a reform to produce lasting change, the reform must be grounded in a quality idea and a quality process. Because the elementary principal's role is more demanding than ever, elementary school principals need opportunities to engage in intentional sensemaking processes to build coherence around reform efforts to avoid burnout (Spillane & Anderson, 2014).

Elementary school principals play an instrumental role in mobilizing staff to implement reforms (Ganon-Shilon & Schechter, 2017b). With educational reforms increasingly determined by federal, state, and district central office leaders, elementary school principals play a pivotal role in translating these reform efforts into practice by supporting their staff's development to implement such reforms. Elementary school principals are responsible for clearly communicating the purpose of and commitment to the reform as well as developing a collective commitment to achieving coherence around

the reform efforts (Fullan & Quinn, 2016). Research has also indicated that the extent to which the reform is implemented depends on the opportunities for sensemaking that principals experience (Soini et al., 2018). However, there is often a lack of consistency in reform implementation because principals use their prior knowledge, experiences, and local context to interpret and communicate the messaging, which impacts the level of implementation (Ganon-Shilon & Schechter, 2017a, 2019). Elementary school principals are responsible for making sense of and shaping these external reform demands to fit their local context, which in turn affects the level of success. However, there is little research on how elementary school principals make sense of and enact their role while implementing reform efforts (Ganon-Shilon & Schechter, 2017a, 2019; Spillane & Anderson, 2014). Werts and Brewer (2015) suggested that further research is needed to understand how elementary school principals communicate and how they communicate with others when implementing policy reform.

Coherence in Reform Implementation

The goal of implementing education reform is to improve the educational system by building coherence around the reform goals. The increasing demands of educational reform initiatives require coherence, which is essential for achieving whole system change (Fullan & Kirtman, 2019; Fullan & Quinn, 2016). Fullan and Quinn (2016) defined the process of building a collective commitment to change as creating coherence or “the shared depth of understanding about the purpose and nature of the work” (p.1). At the school site the principal is responsible for building coherence, which is an ongoing

process of individual and shared meaning making across the people and the culture (Fullan & Quinn, 2016).

Fullan and Quinn's (2016) coherence framework focuses leaders on the right drivers to implement lasting change. The four components of Fullan and Quinn's coherence framework are focusing direction, cultivating a collaborative culture, deepening learning, and securing the accountability needed for system change to occur. Focusing direction means developing a shared moral purpose and a collective understanding of the meaning and direction for meeting that purpose. Cultivating a collaborative culture means developing a team focused on sustained growth and capacity building. Deepening learning is the commitment to effective pedagogy, innovation, and clarity on learning competencies. Securing accountability refers to the conditions needed to develop external and internal accountability throughout the system (Fullan & Quinn, 2016). Addressing these four drivers is a complex process that the district central office and elementary school principals can use to help others make sense of the reform and build coherence to create lasting change.

Coherence is not something an individual alone can achieve because, by its very definition, it must be integrated within the culture by the staff (Fullan & Quinn, 2016). Fullan and Quinn (2016) described coherence as "simplexity" (p. 127), taking a complex problem and identifying clear, actionable steps for implementing reforms. Coherence is not something an individual alone can achieve because, by its very definition, coherence must be integrated within the culture by the staff (Fullan & Quinn, 2016). Elementary school principals serve as the local policymakers and mediating agents to develop

organizational coherence with staff at the school. Sensemaking influences how a principal will build coherence of the reform at their school site because sensemaking is how people make sense of new events or information and share that information with others (Schechter & Shaked, 2017). For example, Stigliani and Elsbach (2018) conducted a study on the sensemaking, and sense-giving processes used in business organizations and found that these processes are vital to developing and maintaining organizational identity, which is essential for building coherence. Like business leaders, elementary school principals are responsible for developing and maintaining the school's vision for student learning and communicating that vision to the staff so that any change becomes a part of it. Additionally, a study by Rikkerink et al. (2016) indicated the importance of collective sensemaking as a prerequisite for implementing changes into teaching practice; schools that sustained the changes, or the reform, employed distributed leadership and positively influenced the reform. Fullan and Quinn described this as coherence because there is a collective understanding of the purpose of the work "in the minds and actions individually and especially collectively" (p. 16). To develop coherence, elementary school principals need to make sense of the reform individually and then engage in actions to support their staff in making sense of the reform.

When implementing reforms, elementary school principals tend to use their discretion for determining exactly how a reform will be implemented at their school. Donaldson and Woulfin (2018) suggested that it is necessary to consider the intermediary role that principals play between policy and teachers, and they recommended further research to investigate the costs and benefits of principals' decision-making when

implementing reforms. Principals in their study who used discretion most often focused on the reform's development goals rather than the accountability goals (Donaldson & Woulfin, 2018). Schechter and Shaked's findings (2017) similarly indicated that principals want to maintain their flexibility despite rigid reform expectations, and they suggested additional studies are needed to explore principals' considerations when implementing reforms. Brown et al. (2015) also suggested that small-scale sensemaking studies have significant value in our understanding of organizational coherence at the micro-level. Inconsistent implementation may occur because principals decide how and what they will implement at their school site.

District central office leaders and elementary school principals often fail to successfully implement reform and achieve coherence because they are working on too many initiatives (Fullan, 2019). When introducing a reform, the site principal must either change direction or integrate the reform to ensure “continuity *and* innovation” while developing coherence (Fullan & Quinn, 2016). In reality, this often does not happen. For example, Ganon-Shilon and Schechter's (2019) study, Israeli high school principals only partially implemented a national reform, or they undermined the reform guidelines. These principals enacted their interpretation of the reform to support their local interests, impacting coherence. Fullan and Kirtman (2019) cautioned that distractions to building coherence could leave even the most influential leaders discouraged and overwhelmed; as a result, leaders will settle for alignment and order, and ultimately fail to achieve coherence. For elementary school principals to build coherence, they must integrate the reform into their current school vision and cultivate a collaborative culture that focuses

everyone on a shared purpose by engaging in a deep understanding of how the reform will improve students' learning while also securing both internal and external accountability to drive the reform effort. Thus, coherence begins when organization leaders narrow their focus when implementing a reform.

Sensemaking is central for elementary school principals who seek to develop coherence because sensemaking is a way to make meaning and determine what actions to take in any situation. Understanding the role of sensemaking in reform implementation can create the opportunity to shift the focus from accountability to principals' development as a leader (Ganon-Shilon & Schechter, 2019). Because the purpose of education is to change people (Corsi, 2020), this shift from accountability to development means that educational organization leaders must understand not whether the reform is implemented with fidelity but how the reform changes the individual and even the organization, which further supports the notion of coherence toward a reform initiative.

The research is clear. District central office leaders can play a critical role in supporting elementary school principals in making sense of educational reforms (Ford et al., 2020; Honig, 2012; Johnson & Chrispeels, 2010), and principals play a key role in implementing reform efforts at the school site to improve student achievement (Fullan & Quinn, 2016; Ganon-Shilon et al., 2020; Spillane & Kenney, 2012). With the increasing demands of external reforms coming from federal, state, and districts, the principal's role is pivotal to ensuring effective implementation. While principals' decision-making can significantly impact reform implementation, more research is needed to understand how elementary school principals' sensemaking influences their implementation of reform

initiatives to improve student achievement (Ford et al., 2020; Ganon-Shilon & Schechter, 2017a; Ganon-Shilon et al., 2020). This study may fill in a gap in the literature by applying sensemaking theory as a conceptual framework to understand how district elementary principal sensemaking influences their decisions regarding reform implementation at their school sites to improve persistently low student achievement. The implications for positive social change may help both district central office leaders and elementary school principals to be better equipped to identify effective processes that make sense of educational reforms, thus increasing their effectiveness as change agents to positively impact student learning and achievement within their local school system.

Implications

This study's evidence may provide information on how district elementary school principals make sense of reform initiatives, which can improve the implementation of reforms aimed at improving student academic achievement. Although research studies have indicated that the principal is key to effectively implementing reforms that improve student achievement, little is known about how elementary school principals' sensemaking influences the decisions they make when communicating or taking action to implement reform with their staff (Ford et al., 2020; Ganon-Shilon & Schechter, 2019; Ganon-Shilon et al., 2020; Schechter & Shaked, 2017). The evidence of this study might contribute to the practices of elementary school principals during reform implementation, offering a clear understanding, through elementary school principals' perceptions and experience, of how sensemaking influences their decisions to implement a reform to improve student achievement.

Challenges to any reform implementation can occur, depending on how individuals interpret, understand, and enact the reform. Sensemaking determines how people decide to embrace, adapt, adopt, or reject the change (Weick et al., 2005). Principals' sensemaking processes determine their understanding and motivation to lead their staff to implement a reform or not, and to what degree. Interpretation and understanding depend on the individual's background, personal context, and values, which need to be accounted for when framing educational change (Burriss & Ring, 2008). Elementary school principals each have their backgrounds, experiences, and contexts that influence how they make sense of reform efforts and build coherence at the school level with their staff. Lawson et al. (2017) indicated that the trust-communication connection must be cultivated throughout the reform implementation process because trust and communication are integral to the innovation process of reform. A gap in communication or a lack of trust can cause people to make sense of the new information that may differ from what was intended in the reform policy. The actions that a principal takes as a result of their sensemaking will lead them to "buffer or bridge" the reform implementation with their staff (Schechter & Shaked, 2017). While sensemaking occurs throughout the organization, elementary school principals are responsible for the actual implementation and demands as the work intensifies at the school site during reform implementation (Wang, 2020). Additional research using sensemaking as a conceptual framework is needed to develop a comprehensive understanding of elementary school principals' internal process, or sensemaking, that determines their interpretation of new ideas into practice (Ganon-Shilon et al., 2020).

Summary

District elementary school principals' sensemaking influences the way each principal interprets, takes action, and communicates with their staff to implement the STEM reform at their school site in the school district in question. Because the STEM was district-driven, elementary school principals can only interpret the reform; they cannot choose whether to implement the reform because "when action is the central focus, interpretation, not choice, is the core phenomenon" (Weick et al., 2005, p. 404). Individuals interpret evidence to fit what they already know and what they have the skills to accomplish (Honig et al., 2017). Studies have called for additional research to explore sensemaking as a conceptual framework for understanding how principals implement reforms and build coherence with their staff around the reform efforts (Brown et al., 2015; Ganon-Shilon & Schechter, 2017a, 2017b; Ganon-Shilon et al., 2020). With federal, state, and districts demanding educational reforms, the principal's role is pivotal to ensuring effective implementation. Principals are responsible for interpreting the reform and communicating and mobilizing staff toward building coherence to improve student achievement.

As the literature review demonstrates, inconsistent site implementation can occur when individual principals make sense of the reform using their prior knowledge, backgrounds, and experiences to interpret and make decisions regarding how to implement the reform and to what degree. The purpose of this study was to explore how district elementary school principals' sensemaking influences the implementation process of a district-driven STEM reform initiative to improve persistently low student

achievement. In section 2, I provide an in-depth understanding of the case study methodology for this project study, including the qualitative case study design and approach, participant selection, data collection, and the planned data analysis and results. In section 3, I describe the project deliverable, including the rationale for the chosen deliverable. The purpose of the project is described in Section 3, including the local needs the project will address, the rationale for the project, a review of the literature, a project description, a project evaluation plan, and the project implications. Finally, in section 4 I include my final study reflections and conclusions, including implications, applications, and directions for future research as well as its impact for social change.

Section 2: Methodology

In this study, I explored how VUSD elementary school principals' sensemaking influences their implementation process of a local STEM reform initiative within the school district to improve overall student academic achievement. Research has indicated that the role of the principal is key to effective reform implementation to improve student achievement (Fullan & Quinn, 2016; Ganon-Shilon & Schechter, 2017b) and that district central office leaders can effectively support elementary school principals to make sense of educational reforms (Honig & Rainey, 2015; Mania-Singer, 2017). However, little is known about how district elementary school principals' sensemaking influences their interpretations of the initiative to lead such curriculum implementation to improve persistently low student achievement.

This section is organized into seven parts. In the first part, I restate the study's purpose and provide an overview of the parts in the section. The second part contains a explanation of the research design and approach, including a restatement of the research questions as well as a description of the research tradition and the design choice. The third part includes a discussion of the participant selection process and an explanation of how biases and relationships were managed. In the fourth part, I describe the data collection plan, and in the fifth part, detail the data analysis plan and plans for enhancing the credibility, transferability, dependability, and confirmability of the study. The sixth part includes a presentation of the limitations of the study, and the final part contains a chapter summary.

Research Design and Approach

I used a qualitative research design and approach to obtain unique, detailed, and context-rich accounts from the participants (see Ravitch & Carl, 2016). The qualitative approach to research serves to make sense of people and phenomena in their natural settings; in this study, the setting was elementary schools in a specific district facing the implementation of a STEM reform initiative. Researchers contend that all qualitative research is multidimensional because it addresses diverse perspectives, techniques, presentation styles, and states of mind (Prasad, 2018). In a qualitative study, a case study design can be used to understand a single case of a phenomenon; for this study, the case was the implementation of a district-driven STEM reform initiative led by elementary school principals.

A qualitative research approach was most appropriate for this study because the purpose of the qualitative methodology is to understand how people interpret their experiences and how they make meaning from these experiences (see Burkholder et al., 2016). The study did not include any consideration for numerical or statistical data; if it had, a quantitative or mixed-methods approach would have been more appropriate (see Burkholder et al., 2016). Additionally, the sample for this study was purposeful and intentionally chosen based on a specific experience and role, which means that findings cannot be generalized to another population and are specific to the context under study (see Ravitch & Carl, 2016). The process of qualitative inquiry is reporting people's lived experiences in a narrative style and using those narratives to make meaning (Erickson, 2011). Qualitative research is used to discover and describe how people construct

meaning from their lives, and it was more appropriate for this study, in which I explored principals' lived experiences as they make sense of educational reform.

The focus of this study was on elementary school principals' sensemaking in the context of VUSD, a K–12 public district in California's Central Valley. The research questions for this study were focused on information gathering regarding specific experiences of the participants, rendering the qualitative approach most appropriate. The purpose of this study was to explore how district elementary principals' sensemaking influences their implementation of a STEM reform initiative within the school district to improve student academic achievement overall.

Specifically, a case study design was most suitable for this study because it allowed for the exploration of the phenomenon of elementary school principal sensemaking and how it influences reform implementation within one school district. Stake (1995) and Yin (2018) explained that in education, cases are typically programs or people that the researcher seeks to understand. A case study design is a holistic approach that allows the researcher to explore the relationship between the phenomenon and its context (Gammelgaard, 2017). This empirical approach means that the study reflects the subjects' experiences within the case from an emic perspective (Stake, 1995). The current, exploratory study addressed "how" and "why" questions focused on an existing phenomenon (i.e., reform implementation) within a real-life context. The participants in this study were a part of the district's reform initiative.

This qualitative case study encompassed an inquiry into the elementary school principals' sensemaking and interpretations for implementing a STEM reform initiative

within one school district. Interviews consisting of open ended questions were the appropriate method for collecting data because it aligned with the nature of the research questions. Qualitative interviews allow the researcher to examine multiple viewpoints of real-world, multifaceted issues (Rubin & Rubin, 2012).

Participants

The target population was the elementary school principals of K–8 and K–5 schools in VUSD who were implementing the STEM reform initiative at the time of the study. I chose this district for this study because it was in the process of implementing a district-driven, STEM reform initiative to improve overall student academic achievement within the district over 5 years. Purposeful sampling was used to identify participants for this study. Purposeful sampling is most often used to select specific individuals for a project study allowing the researcher to focus on a phenomenon in depth (see Burkholder et al., 2016). I chose participants based on the recommendations of the district project directors overseeing the reform. All participants were elementary school principals at a VUSD school responsible for implementing the district-driven, STEM reform initiative during the time of the study.

Criteria for Selection of Participants

I selected participants that were elementary school principals during the reform implementation process in the school district. The school district has 17 total school principals at seven K–5 elementary schools, four K–8 elementary schools, two middle schools, three high schools, and one alternative high school. At the time of the study, nine K–5 and K–8 schools were a part of the EIR grant, with one K–5 and one K–8

elementary school serving as the comparison sites for the grant. The two comparison schools that were not participating in the EIR grant at the time of the study will be a part of the EIR grant in the final year of the grant.

I invited the nine elementary school principals who were implementing the STEM reform initiative at their schools during the study to volunteer to participate in the study. For this case study, six of the nine elementary school principals volunteered to be participants and provided in-depth insights into the phenomenon being studied (see Burkholder et al., 2016).

Access to Participants

I recruited the participants for this project study via email after attaining Walden University Institutional Review Board (IRB) approval (IRB Approval No. 04-12-21-0039867) and permission from the superintendent of the school district in this study. The nine prospective participants were provided with the study's purpose and goals; an explanation of participant confidentiality, rights, and protection from harm; and a request for participation. I then followed up with each prospective participant who returned the letter of consent to answer questions and confirm their participation in the study. Six of the nine elementary school principals who were implementing the STEM reform initiative at the time of the study consented to being a part of the study.

Researcher-Participant Working Relationship

Because I recently worked at this school district, I had established working relationships with the potential participants. As a researcher, I needed to establish a researcher-participant working relationship because I conducted in-person interviews. To

establish a working relationship with participants, I conducted all interviews professionally, articulating that participation is voluntary and that all responses would remain confidential. I also maintained authentic, honest, and respectful relationships before, during, and after the research (see Ravitch & Carl, 2016). Throughout the process, I developed a rapport such that participants' concerns, interests, and limitations were taken into consideration during the data collection and analysis process (see Ravitch & Carl, 2016). As a qualitative researcher, I recognized that I served as the primary instrument for the study; therefore, I had to be transparent and intentional in handling all relationships with respect and care.

Protecting Participants' Rights

Protecting participant rights is an essential part of the research to ensure that participants are safe from harm (Rubin & Rubin, 2012). Following the Walden University standards and the IRB guidelines, I developed and used all necessary consent forms and documents outlining the roles of the researcher and participants, providing the study's background, and explaining the measures that were in place to protect participant confidentiality and shield participants from harm.

I provided each potential participant with documentation that detailed the study's purpose and participants' rights, including confidentiality. Each participant signed a letter of consent. This letter of consent included the research plans and protocols for ensuring confidentiality and protection from harm. Pseudonyms were used to protect participants' confidentiality. Information collected from the participants, along with the signed consent

forms, are stored in a locked file cabinet in my residence and will be destroyed after 5 years.

Data Collection

I conducted semi structured, one-on-one, virtual, face-to-face interviews following an interview protocol. Participants' responses were digitally recorded with their permission. The interviews took place according to each participant's schedule and lasted approximately 60 minutes. All interviews were completed within a 4-week time frame. Interview questions, derived from the research questions, were open ended and broad enough to encourage in-depth conversations. The interview questions did not include personal or demographic information.

I collected participant-created documents or archival data that the elementary school principals used to communicate with staff to further explore how elementary school principals communicate their understanding of the STEM reform to their staff to create coherence at their school site. These documents included PowerPoint presentations, meeting agendas, and other written documentation that the principals created to communicate the vision and expectations for implementing STEM within the school. Because elementary school principals created these documents in their natural environments, the school setting, they could serve as another data source to increase the validity of the results (see Ravitch & Carl, 2016). These documents allowed me to better understand how elementary school principals communicated the reform to their staff, evidencing how they have influenced the implementation. They also provided a form of

data triangulation with the interview transcripts to increase the validity of the findings (see Denzin & Lincoln, 2013).

Because the researcher is the primary tool in qualitative data (Ravitch & Carl, 2016), I maintained a reflective journal over the course of the study detailing my thoughts and perceptions as the researcher. A researcher should minimize the impact of bias to increase the reliability and validity of the study's findings (Ravitch & Carl, 2016). By regularly reflecting on my thoughts, I was able to actively monitor my own biases and prejudices (see Ravitch & Carl, 2016).

Data Tracking Systems

I used a reflective journal to take notes and write out my thoughts and observations during each interview. An audio transcription application was used to record and transcribe all interviews. Dedoose, a web-based program, was used to organize and analyze the data. During the coding process, I wrote analytic memos to acknowledge and refine my thoughts, ideas, and interpretation of the data (see Ravitch & Carl, 2016). All documents collected are stored securely in password-protected files on my personal computer and kept private. All paper data are stored in a locked file cabinet and will be destroyed after 5 years.

Role of the Researcher

Although I was formerly a director in the district—I served as the director of professional learning and curriculum—I was not employed there at the time of the study. During my employment in the district under study, I did not supervise elementary school principals in any way because principals in this school district report directly to the

superintendent and the cabinet-level associate superintendents. I am no longer directly associated with any prospective participants though I am aware of the culture and climate surrounding the district-driven reform implementation efforts.

In project study research, the researcher is the primary instrument (Ravitch & Carl, 2016) and must explicitly examine their own biases concerning the research. While I did support the project directors in developing the initial training for teachers who designed the STEM curricular units, the project directors were responsible for the vetting, revision, and implementation of the units at the site level. Because I have first-hand knowledge of the STEM grant, I intentionally engaged in a regular reflective process over the course of the study to actively monitor any potential bias and keep this separate from the research. I applied what Ravitch and Carl (2016) identified as a relational approach to research "because it requires that focused and sustained critical attention be paid to the relational aspects of inquiry" (p. 344). Through self-reflection, I was able to be critical of any connection I may have had to the research and learned from the research.

Data Analysis

I transcribed all interviews and then organized the interview data using Dedoose for analysis. I conducted member checking by providing a copy of their interview transcript to each participant who reviewed and confirmed that the interview transcript accurately conveyed their intended responses. Member checking allows participants to review the data before the analysis process (DeCino & Waalkes, 2019). Once all interview transcripts were confirmed as accurate, I uploaded them into Dedoose to code the data using the initial concepts from the framework of sensemaking and coherence

(see Saldaña, 2016). I used a second-rater to review the coding process to further strengthen validity. Initial coding is a process in which the researcher identifies concepts and categories (Saldaña, 2016). I then used axial and values coding as the second-cycle coding method to identify characteristics and develop themes. In qualitative studies, coding is only one aspect of data analysis. As the researcher, I also assured the validity of the findings by explicitly connecting interpretations and data analysis to the coding and theme process (see Ravitch & Carl, 2016). The analysis process included multiple data analysis processes for examining my interpretations of the data, which included "looking for alternative explanations and possible misinterpretations" (Ravitch & Carl, 2016, p. 262).

Data Analysis Results

I used a qualitative project study using case study method to explore how the sensemaking of district elementary school principals influences the implementation process of a local STEM reform initiative to improve overall student academic achievement. The problem was inconsistent site implementation, led by the K–5 and K–8 district elementary school principals of this district-mandated initiative. The findings are presented in this section.

Method for Generating, Gathering, and Coding Data

I conducted virtual 1:1 semi structured interviews, each lasting approximately 40 minutes to 1 hour, with six elementary school principals of K–5 and K–8 schools in VUSD currently implementing the STEM reform initiative. All interviews took place between March 20, 2021, and June 11, 2021. Each interview consisted of 12 questions.

During the interviews I requested copies of participant-created documents or archival data that the elementary school principals used to communicate with staff regarding the reform implementation process or expectations.

I recorded interview transcriptions using an audio transcription application and then edited by me for accuracy. Following each interview, I scheduled a follow-up meeting with each participant to review the accuracy of the interview transcripts. Additionally, nine archival documents were provided by participants, allowing for triangulation of the data to explore further how elementary school principals communicate their understanding of the STEM reform to their staff to create coherence at their school site.

Once participants acknowledged the accuracy of the transcripts, I used Dedoose, a web-based program, to organize and analyze the transcripts and archival documents using initial and axial coding to identify recurring themes and patterns. Throughout the process I also wrote analytic memos to clarify my thoughts, note biases, and identify emergent themes. I used thematic analysis to identify themes. During the initial coding process, I identified words and phrases that represented recurring ideas in participant responses. I used initial coding to identify and label distinct excerpts and then combined initial codes into axial themes, integrating subcategories and categories into themes aligned with Fullan and Quinn's (2016) coherence framework.

Findings for Research Question 1

The findings that emerged from the data analysis indicated four major themes that elementary school principals consider when making sense of the district-driven STEM

reform initiative to improve overall student academic achievement. The first theme indicated elementary school principals make sense of the content of the STEM reform initiative based on their own background and experiences. The second theme was that elementary school principals consider teachers' needs when making sense of the reform. The third theme was that elementary school principals valued collaboration as a part of their sensemaking. Finally, the fourth theme was that elementary school principals make sense of the reform expectations through the district's external accountability measures, which required principals to submit data of site implementation team meetings, evidence of instructional rounds, and dates for teacher professional learning.

Theme 1: Elementary School Principals Make Sense of the Content of the Reform Through Their Backgrounds and Experiences

Each elementary principal in the district being studied framed the STEM reform initiative around their background, prior knowledge, and school focus. P1 focused on STEM as a part of a multitiered system of support (MTSS), stating, "I understood it to be a comprehensive system to weave what we identify as STEM into our everyday instructional approach," but added, "I don't know that, really, that principals have an understanding that the STEM initiative is intended to directly improve persistently low student achievement." P1 further indicated a need to understand the why behind the STEM reform initiative, "I don't know, if I have the necessary clarity, to understand exactly the fundamental purpose for why we took this route versus another."

P2 also questioned the goal of the STEM reform initiative, "is it specifically aimed at, you know, lower test scores or lower-achieving students? Maybe not

necessarily" and framed the vision of STEM around a personal experience. "I'm very, you know, me, you know, personally, I just love the hands-on activities I love anytime where you can explore and get kids talking about things." Both P1 and P2 disagreed that the goal of the STEM reform initiative is to improve persistently low student achievement. P4, on the other hand, was confident that:

> As a district that we wanted to give that opportunity to all students, so all students can have exposure, and have more variety of students participating, especially when you're talking about high school and, you know, single subjects, that they are part of that, and for low achievement will certainly that we would see an increase in student progress.

P3 shared that the school is an Advancement Via Individual Determination (AVID) school, "we worked to have AVID, and STEM complement each other, and we unite them when possible. STEM is the essence of troubleshooting and higher-level thinking while AVID is how to be organized and use different strategies." P4 framed all responses around collaboration and building the capacity of teachers, using phrases such as "growth," "involvement," and "deeper understanding" to describe the process of implementing STEM.

P5 believed that the STEM reform initiative is about "providing 21st-century teaching and learning to students" because "our STEM curriculum is really a vehicle for doing so" and makes sense of the reform initiative through instructional strategies. "I expect my students, my teachers to be using sensemaking notebooks and all classrooms,

they do not have to look identical, but I expect to see some sense making I also expect to see students talking to each other."

P6 communicated a vision of integration "um, you know, I would really like to see STEM, PreK-5, just whether it's questioning techniques, it's, you know, hands-on projects, it's design challenges, it's, you know, just getting kids to think about their learning" while also continually expressing the need to better understand the STEM reform initiative. Each principal understood the STEM reform initiative through their own lens and school direction.

Theme 2: Elementary School Principals Consider Teachers' Needs When Making Sense of the Reform Initiative

Other data indicate that elementary school principals respect their teachers and want to support and, in many cases, protect them from initiative fatigue and burnout. Each elementary school principal indicated a desire to build the capacity of their teachers to implement the STEM reform initiative, though not all were sure of exactly how to do this without increasing teacher workload. In consideration of teachers' needs, particularly during the COVID-19 pandemic, elementary school principals considered teachers' readiness for change. P1 explained, "let's roll up our sleeves, find out what we can do in a way that is functionally doable. That won't freak people out. And that is validating to the real health and emotional concerns that people have." P1 further described making decisions to protect teachers:

> If you've read a culture of fear, there's this idea of professional paralysis, and we needed a process to address this. And so, it spoke to the time, place, and context

> of the last year and some change from the world, as we know, it had shut down. And we were meeting people with true emotional concerns and emotional stressors and still pushing forward something that at the time, maybe some of these teachers thought was a waste of time. We don't even know how to do digital learning. Why do you care about STEM? It would have been a bogus answer. Hiding behind policies to say, well, because it's the grant, we have to do this, that would show that I was emotionally out of touch with my staff. And so, I wasn't gonna do that.

P6 also articulated concern for teachers continuing to implement the reform during a pandemic, “we’re in COVID, that’s a big impact right now. My teachers are like, I can’t even get my kids to read and write; how am I supposed to get them to, you know, do these projects?” Upon further reflection, P6 shared:

> Once they got a little more comfortable with everything, the distance learning, they were able to implement STEM a little bit more, and now that we’ve got most, most kids back in person, they’re, you know, a lot of them are like, that’s all we’re focusing on.

P2 said this about the role of the principal, “your most important job is to be a buffer between you and the district, between the teachers in the district.” P2 further expressed high regard for teachers stating,

> I don’t have anyone that's just going to mail it in. I think they really want to do their best. So, you know, they hunkered down, and they got to it, and started implementing to the best of their knowledge.

P2 also communicated that when the pandemic hit, there was a pause in the STEM reform implementation as teachers learned to use digital platforms for teaching virtually. And while P2 expressed frustration at the expectations that implementation of the STEM reform continues, there was an acknowledgment of the instructional growth teachers made during the pandemic:

> I think we can look back and say there was definitely a positive impact. There were a lot of growing pains. There was a lot of struggling, some crying in some career, reassessing early on because the technology was so challenging, the platform wasn't perfect, and we were just trying to get there, but now that we've now that we've gotten comfortable with using technology and teaching with technology and learning and trying new things, that honestly that I think it has opened up a lot of eyes and doors for teaching and learning.

P2 expressed an additional concern for teachers, stating, "the biggest concern for me is, we have a bunch of teachers that are multisubject, teachers teaching in the primary grades, whose background is not science is not technology." P2 communicated frustration at the expectation that teachers with multiple subject teaching credentials are expected to develop integrated science lessons when "they simply don't have the background or experience in that to develop lessons. So, they are struggling themselves to understand first the science and technology behind what they're teaching." P2 was the only principal to express concern about teachers' content knowledge regarding STEM subjects.

P3, P4 expressed concerns for teachers' time, while P4 and P5 spoke highly of their teachers. P3 considered teachers' need for time, "I was faced with the challenge of how teachers fit 30 minutes of STEM/Science in their daily routines when they have so much on their plate. This is where the idea of STEM is everywhere came about." P4 articulated high regard for teachers, "I feel confident when saying all of my teachers are implementing the units. And they're doing it well," and expressed teachers' frustrations about teachers' lack of time available for implementing STEM, "we don't have time for every single subject." P5 shared,

> I didn't want them to feel like they weren't adequate" when expressing concern for the level of stress teachers were under during the pandemic. They always want to look good. They want to make sure they represent [school] in the best light possible. And so, like I said, they hold themselves to a high standard, knowing how sensitive and how much they take to heart.

When articulating her decision-making process, P5 further articulated, "…my staff is very sensitive. They hold themselves to a very high standard. And if they are not at proficient or advanced in an area, they feel very inadequate, and they are far from inadequate teachers." Thus, all principals stated that they make decisions based on how they can meet their teachers' needs, including emotional needs, as well as their pedagogical needs. According to their perceptions, principals sought to balance teacher needs with the requirements of STEM to increase teacher compliance to the demands of the reform.

Theme 3: Elementary School Principals Value Collaboration as a Part of Their Sensemaking

Five of the six elementary school principals articulated that they valued the collaboration with their site leadership teams and the professional learning opportunities provided by the district to guide STEM reform implementation efforts among teachers. P1 shared that the site leadership team was integral to implementing the STEM reform initiative:

> These are the people who help lead this work. So, this was an ongoing process with my site implementation team bringing their information related to specific STEM disciplines, the STEM initiative, how we're going to weave it into instruction, and then helping to train and helping my broader guiding coalition understand what we were trying to accomplish.

P3, P4, P5, and P6 also indicated that their site implementation teams, all made up of teacher leaders, were integral to implementation efforts. P3 explained that at his site, the SIT and the teachers on special assignment (TOSAs) from the district met weekly to plan professional development for staff, engaged in classroom walkthroughs, and determined future goals and training needs for the site. P1, P4, P5, and P6 also explained that the district TOSAs collaborated with their site implementation teams and provided professional learning to support implementation efforts at their school sites.

P1 shared that the site implementation team "works closely with professional learning." P4 similarly explained, "we have our TOSA that supports our site." P5 said that the instructional strategies that defined implementation at the school site were taught

“in the rollouts with professional learning [department],” and added that the strategies “are essential components of STEM instruction.” Moreover, P6 shared “the TOSAs provided lots of PD” and added, “there's been support from professional development in looking at what each site is doing.” Opening up the school to the district TOSAs helped accelerate implementation at P3's school site “so that they're knowing our journey of where we go, and we are just hearing honest feedback.”

While P2 did not speak about a leadership team, P2 did communicate what he felt was an effective collaboration for understanding the initiative from a principal’s perspective:

> I think the best experiences I’ve had with understanding the grant is working with teachers and watching the teachers looking at the actual lessons and plan. Because when you start digging deeper into the RCD [Rigorous Curriculum Design] units, and the actual content and the standards, and what they’re trying to do that gives you a bigger understanding of, you know, what’s the purpose of this lesson? What’s the purpose of this unit? And how is that? How is that driving instruction and instruction and learning? I think just looking at it at that level really helped me understand the purpose of the initiative and kind of where we're going with all of this.

P5 was the only principal to articulate district-level support through a principal Leadership Academy, an external coaching provider, and principal coaching from district-level directors as mechanisms for supporting the implementation of the STEM reform initiative. For this district the purpose of Leadership Academy was to build the

capacity of principals to be instructional leaders, leading the STEM reform initiative at their sites. P4 thought that the monthly virtual professional learning opportunities for teachers "to really go over the units" gave teachers "opportunity not only to really understand the unit, be able to ask questions about the unit, I think that that has been really helpful, and has helped me a lot with what does it look like?"

On the other hand, P1 explicitly spoke about the lack of support:

> I don't know what support means. Does that mean that they can engage in an entry point where we can talk through our frustrations, perhaps? Does that mean they can provide monetary resources to support the fact that our school doesn't have enough money, perhaps?

P6 also expressed the need for more support to understand the initiative, "I just think there needs to be more support and more stuff before we say, Oh, this is what we're doing because it's good for kids."

In short, elementary school principals used and wanted more collaborative opportunities to make sense of the STEM reform initiative and make decisions regarding implementation at their school sites from these experiences. Engaging in collaborative learning opportunities increased shared decision making at the school between teachers and principals and the confidence in elementary school principals regarding the decision-making to support reform implementation. However, some participants questioned the type and quantity of perceived supports, questioning the vision and available opportunities to deepen learning for themselves and their teachers.

Theme 4: Elementary School Principals Make Sense of the Reform Expectations Through the District External Accountability Measures

Throughout the interviews, each elementary school principal communicated common STEM reform initiative requirements. These external accountability requirements were verified through archival documents provided by the elementary school principals and were communicated in interviews. The required external accountability measures were as follows: a.) each school should have a site leadership team, b.) each school should engage in professional learning related to STEM implementation, c.) each school should allocate funding to pay for STEM materials. Elementary school principals had mixed feelings about the accountability measures and their interpretations of each measure.

The site leadership team was expected to meet monthly; conduct instructional walkthroughs using the Collaborative Instructional Review (CIR) rubrics on rigor, relevance, and engagement; provide at least three staff-wide training to support STEM implementation; and coordinate at least three support visits from the district team. While elementary school principals viewed the site leadership team as valuable in making sense of the STEM reform initiative, elementary school principals had mixed feelings about the district's external accountability measures. Participants expressed frustration at the initial rollout of the initiative and a lack of clear vision. P1 expressed exasperation when recalling the goals for year one of the STEM reform initiative:

> I recall vividly a statement that the goal for year one was to dip our toe in and have some fun. That was probably the single most professionally unsatisfying

> thing I've ever heard, because I don't know which toe I was supposed to dip in. And I don't know how much fun I was supposed to have had to be able to understand if I've had enough fun.

While P1 communicated, "we know what we're looking for is grounded in the rubrics," he ultimately stated that expectations are not well-defined, "I still don't know that there are clear expectations of what STEM looks like beyond the design challenge." P2 continued to express the need to protect teachers, sharing that he "went rogue" because:

> They completely ignored the fact that we were on distance learning, and we didn't have kids in the class. That was absolutely maddening. Because it's like, well, no, you have to do this. And it's like, Do you realize what year this is and what we are doing? Because you need, you need to understand that. And so, there was a complete disconnect this year. That was absolutely frustrating.

Every participant articulated the use of the Curriculum and Instruction (CIR) rubrics developed by the International Center for Leadership in Education as a tool for accountability. P1, P3, P4, and P5 indicated that CIR rubrics were a tool used to address instructional strategies related to STEM, with each principal articulating a focus on higher level questioning. P1 spoke about grounding goals in the CIR rubrics, "we look at the intentional instructional design, what that impact is on student learning." P4 articulated the compliance aspect of instructional rounds using the CIR rubrics, "We certainly have our walkthroughs that's an expectation, you know, collecting some of the

evidence from those walkthroughs and putting it into the platform. Those are things that are expected from us."

P5 was the only participant who indicated that the superintendent required monthly meetings with each principal, which "really held us accountable. So, a lot of principals ended up doing our instructional rounds with our CIR, which we had done in the past." Participants indicated they were accountable by the district for conducting instructional rounds, with P4 the only participant to indicate there is a "platform" to store the data. The digital platform was a way for principals to log their instructional rounds and to use the data to make informed decisions regarding implementation. While P1 shared that the instructional rounds are "about systematizing and normalizing the continuous improvement process," no other participant clearly articulated why they collect instructional rounds data using the CIR rubrics beyond monitoring for higher level questioning.

While P4 thought the accountability checks by the project directors regarding task completion were "helpful to really get us to not only do it but reminders so that we keep up to date on keeping track and documenting everything that we are doing," other principals expressed frustration at the compliance expectations. P6 argued, "Okay, well, what kind of support is there?" adding, "we have the rigor, we have these rubrics, but how do we do this? What kind of training or supports are we giving staff to really get to that point that they're fully incorporating higher level questioning?" P2 also expressed frustration at what he felt was lack of support for implementation:

> You can't do a top-down approach. It doesn't work. It doesn't work. So, you know, we, I don't even know where I'm going with this. except to say that, if we want this to work, we've got to get, we've got to make teachers comfortable with the content.

Most participants found the external accountability measures frustrating and articulated a lack of clear vision and direction for the STEM reform initiative. Half of the elementary school principals interviewed suggested that district leadership should provide a clear vision and more training to support implementation, while the other half of elementary school principals who were interviewed articulated a shared vision and strategy-driven action steps to support implementation. The COVID-19 pandemic caused increased frustration among all participants regarding the STEM reform initiative accountability expectations during distance learning. One commonality regarding the external accountability measures that all participants perceived as providing clarity was the district-wide use of the CIR rubrics to define effective teaching and monitor instruction.

Findings for Research Question 2

The findings that emerged from the data analysis indicate three themes that elementary school principals consider when using their interpretations of the initiative to lead such curriculum implementation. The first theme indicated elementary school principals' developed their unique vision for the STEM reform initiative. The second theme was that elementary school principals' confidence in their vision influenced how they lead the STEM reform initiative. Finally, the third theme was that elementary school

principals selected instructional strategies for teachers to implement based on their unique vision for STEM.

Theme 1: Elementary School Principals Developed Their Unique Vision for the Reform Initiative

Each elementary principal developed their own vision for the STEM reform initiative. Each vision differs slightly because each elementary school principal used their prior background and knowledge to do so. While all six elementary school principals communicated that one goal of the STEM reform initiative is to increase students' ability to think critically and engage in hands-on learning, their vision for the STEM reform varied.

P1 stated, “The vision for STEM is to make STEM a woven tool into our multi-tiered system of support (MTSS) process, which I would call our professional learning community (PLC) process,” and added “STEM needs to be normalized at the tier one powerful instructional level.” P2 explained that “the whole learning by doing is huge” and that STEM is when you “use your hands and your minds,” which led to an ah-ha moment regarding a vision for STEM, “My goodness, I think that that is my vision for learning and STEM." P5 articulated “providing twenty-first century teaching and learning to students” as the vision for the STEM reform. P5 added that the school focuses on three instructional strategies provided by the district “sense-making notebooks, science talks, and five E instructional [lesson] design.” P5 articulated that “I make sure that our school vision aligns to the district vision, because it doesn't make sense for us to move in two

different directions. We all need to be in alignment." P1, P2, and P5 all communicated differing visions for the STEM reform initiative.

P3, P4, and P6, on the other hand, articulated that the STEM reform vision is to integrate STEM into all content areas. P3 communicated, "We need STEM to be everywhere in every lesson" and expressed excitement at the focus on STEM in K-12 because he is a former science teacher. P3 also integrated STEM and AVID because they "complement each other." P4 stated, "my vision for STEM implementation is to really look for more of the integration into all the subjects." P6 communicated a vision of integration "um, you know, I would really like to see STEM, PreK-5, just whether it's questioning techniques, it's, you know, hands-on projects, it's design challenges, it's, you know, just getting kids to think about their learning" while also continually expressing the need to better understand the STEM reform initiative. Each principal articulated their own unique vision for the STEM reform initiative based on their own experiences and values. Each vision, in turn, influenced the strategies for implementation and direction for implementation of the initiative at their school site.

Theme 2: Elementary School Principals' Confidence in Their Vision Influenced how They Lead the Reform Initiative

Elementary school principals developed their own vision of the reform through their sensemaking processes. Each elementary school principal then set out to implement this vision at their school. Elementary school principals who communicated they felt they lacked context and clarity of the district vision for the STEM reform initiative argued they were not clear what action to take and had to figure it out independently, which

caused frustration. Throughout the interview, P1 articulated frustration at his perception of the lack of clarity around the purpose and goals of the STEM reform initiative and the expectation that the principal's role is to communicate the vision:

> There is no guarantee that I'll be able to communicate it in exactly the way it was supposed to be communicated. And then there is certainly no guarantee that the person I'm communicating to will understand it in the way that I do. So, you know, that's real, it can't be minimized.

P1 further communicated:

> I think of where our school is, where we want to go, and weaving in the role of STEM discipline-based instruction into our broader schoolwide instructional framework. So, the experiences I have had, really were things I would say that we developed on our own, because in the absence of a cohesive course of action and timeline, we just had to pick a place and start.

P2 and P6 also expressed frustration throughout the interviews regarding their perception of the lack of clarity regarding the vision and goals for the STEM reform initiative. As a result, P2 and P6 generally spoke about teachers implementing the curricular units without providing specific actions. P1, while not confident in the district vision for STEM, was confident in his own vision and stated he "work[s] very closely with my site implementation team" to "make STEM a woven tool into our MTSS process, which I would call our PLC process," or what he considers his vision for STEM. To implement this vision, P1 articulated teachers were implementing a five-why strategy and a see-think-wonder strategy.

P2 and P6, on the other hand, were not clear of their vision for the STEM reform initiative, and as a result, they shared little about how the STEM reform initiative was being implemented at their sites. They instead focused on a general statement regarding hands-on learning and critical thinking skills for students, with P2 stating "STEM is exploring content, or ideas or whatever, and being able to talk about it in practice, and work through it," and P6 sharing that STEM is when students are "using their own questioning and analyzing and critical thinking." Both P2 and P6 expressed that they support STEM as a concept, and teachers generally implement the units at their schools. P2 articulated the following about the site teachers, "they started implementing, to the best of their knowledge." P6 also shared,

> Some teachers are implementing STEM the last few weeks; they're really committing to it. Some have done it all year. Some have said, yeah, I'll get to it when I get to it. Some are really focused on it now.

P3, P4, and P5 all communicated with confidence a similar vision for the STEM reform initiative at their sites around integrating STEM into all content areas through instructional strategies. This vision influenced their decisions for implementation efforts at their schools. P3 integrated the STEM vision into the school vision:

> One of the first decisions I made was to eliminate all the different initiatives I had at my school. We had too many initiatives happening at the same time. We made AVID school wide and STEM a priority. We also worked to have AVID, and STEM complement each other and united them when possible. STEM is the essence of troubleshooting and higher-level thinking, while AVID is how to be

> organized and use different strategies to make it happen through Writing, Inquiry, Collaboration, Organization, Reading learning support structure(WICOR). Before uniting AVID and STEM, we were faced with the problem of teachers only doing STEM during design challenges and saying they don't have time in their day to do STEM.

P4 made decisions grounded in giving all students access to an integrated STEM curriculum and connected STEM to the school's vision, "So, you know, if you look at our vision statement, it talks about all students, it talks about being successful. But we talked about what does that look like? What does that mean?" P4 used this frame to focus on instructional strategies. P5 also made specific decisions regarding implementation around her vision. P5 expressed that site teachers had access to collaborative lesson studies to learn how to implement specific instructional strategies, "the district vision for STEM is what's been communicated to us is, we are still on those three different things, those three different aspects of STEM instruction: sensemaking notebooks, science talks, and 5E instructional design." These three principals were confident in their vision for the STEM reform initiative and decided to implement the reform through specific instructional strategies.

Interestingly, each of the elementary school principals who were confident in their vision also saw themselves as learning leaders, learning alongside their teachers. P3 and P4 made decisions by collaborating with their leadership teams. P3 shared that "having conversations with the leadership team" helped determine strategies because "everything we do has a purpose in the AVID STEM world; it is sort of what we try to keep our

alignment." P4 explained of the site implementation team, "They're the ones that not only provide professional development, but check-in, you know, myself included checking in with teachers, and how it's going with our monthly walkthroughs. We also have a really good idea as to the STEM implementation." P3 also added:

> Really being able to analyze what the group understands what we're supposed to be doing. So that we have those more in-depth conversations, instead of that just superficial, let's do the fun part from the unit. So, I certainly feel really confident that our group is heading in the right direction as to what we're implementing.

P4 made instructional decisions with the leadership team as well, explaining they are really a "continuous improvement team" and gave an example that the team "decided to make sensemaking notebooks the focus."

Theme 3: Elementary School Principals Selected Instructional Strategies for Teachers to Implement Based on Their Unique Vision for the Reform Initiative

Four elementary school principals indicated expectations that their teachers are implementing instructional strategies to support the STEM reform initiative, while two elementary school principals spoke about a more general concept of student engagement. P1 shared that he worked with the site implementation team to identify instructional strategies to support the implementation of the STEM reform:

> That is the focus of our ongoing instructional team collaboration time whether we're talking about something specifically hard sciences related or not becomes less relevant, because we're talking about systematizing and normalizing the continuous inquiry process and everything we do.

P1 further articulated that “see, think, wonder” and “the five why” are strategies site teachers should incorporate into their instructional design as a way to focus on high-level questioning.

P3 said that his school is focused on:

> The philosophy that STEM is everywhere. STEM is in English language arts, math, social studies, and science. By having this idea teachers don’t have to add one more item to their planning but instead focus on incorporating phenomena, higher-level questions, and rigor into their lesson plans.

P3 also shared, “we have focused on higher level questions, which aligns with AVID as a school-wide initiative,” suggesting that using AVID strategies supports STEM implementation. P5 indicated a focus on three district selected instructional strategies “5E [lesson design], sensemaking notebooks, science talks, that I learned about in the rollouts with professional learning, so I’m fully on board with them based on the training that I’ve had as they are essential components of STEM instruction.” P5 was the only principal to indicate district expectations with regards to strategy implementation.

P6 articulated a more broad approach to instructional strategies, “I would really like to see STEM, preK–5, whether it’s questioning techniques, it’s hands on projects, it’s design challenges, it’s, you know, just getting kids to think about their learning, and thinking about the processes of their learning,” and added that she provided training in storyboarding “to provide more options and more professional development for the staff to have different strategies they can use to implement step by step.” P2 did not articulate any specific instructional strategies, instead, P2 focused on “getting kids involved, getting

them talking, getting them engaged, getting them doing things and not going back to, you know, sitting reading and, and not engaging kids." P4 also did not articulate specific strategies other than to say, "we really worked on engagement, and relationships" and added that with the district TOSAs, the site leadership team "developed professional development on that area."

Accuracy and Credibility

Accuracy and credibility are critical to the research process. I followed the guidelines provided by Walden University's IRB to address the accuracy and credibility of this study. To ensure the validity of this study, I conducted member checks. Member checks allow the researcher to affirm that findings accurately reflect participants' experiences (Ravitch & Carl, 2016). Member checking is a technique that allowed participants the opportunity to verify that the transcripts accurately reflect their experiences. Each participant was provided a copy of the transcript from their interview 2-weeks after the interview was held. Participants then reviewed and clarified their responses as needed, with participants having 4-weeks to provide any changes or clarifications of the transcript.

Data triangulation was also used to enhance the validity of this study. Data triangulation is the process of looking at multiple sources of information and perspectives to answer the research questions (Ravitch & Carl, 2016). For this study, participant interviews and archival documents along with interview notes and researcher reflection were used in this study to create triangulation. The participants in the study engaged in 1:1 interviews and were asked to provide any documents they created to communicate

with their staff regarding the reform implementation processes, expectations and/or vision for STEM. The goal of using a data triangulation strategy for this study was to gather data that provided both quality and a depth of information to allow for answering the research questions (see Ravitch & Carl, 2016).

Discrepant Cases

Discrepant cases with variations in perspectives and beliefs were addressed and included in the findings. Participant responses were analyzed, considering whether responses were unique compared to the responses from other participants in the study. The responses from discrepant and unique cases were considered and reported in the findings, with discussions of each case that did not fit within emerging patterns or themes. There were three discrepant cases which were all reported in the findings.

One discrepant case was one participant who did not articulate that collaborating with a leadership team influenced the sensemaking process. At the same time, all other respondents communicated that they valued collaboration with their leadership teams and the collaborative professional learning opportunities provided by the district. While the elementary school principal did not indicate collaboration with a leadership team, this participant did articulate that what most impacted personal sensemaking was working alongside teachers at the school site to review lesson plans. This discrepant case may provide district central office leaders insight into principals' decision making processes and perceptions regarding reform implementation.

There were two more discrepant cases regarding the district provided support for implementing the STEM reform initiative. One discrepant case was a participant who

shared that sensemaking occurred through district-level support through a principal Leadership Academy, with an external coaching provider, and principal coaching from district-level directors served as mechanisms for supporting the implementation of the STEM reform initiative. The other discrepant case was a participant who indicated that the superintendent required monthly meetings with each principal. Both discrepant cases were reported in the findings. These cases could help district central office leaders consider the effectiveness of current practices in influencing elementary school principals' sensemaking and interpretations of the district-driven STEM reform initiative.

Limitations

This study was limited to the responses of the elementary school principals in a specific K–12 public school district who are implementing the district-driven STEM reform, which limits the ability to generalize the findings. The small size of the research population and the fact this the study was conducted with only K–5 and K–8 elementary school principals were additional limitations. Other factors that limited the research findings included the number of years that each principal served in their position at the school and within the district. An additional limitation was that data was not collected from district central office administrators and teachers.

Summary

The research problem addressed in this qualitative project study was the inconsistent site implementation, led by the K–5 and K–8 district elementary school principals of this district-mandated initiative. The purpose of this study was to explore how district elementary school principals' sensemaking influences the implementation

process of a district-driven STEM reform initiative to improve persistently low student achievement. Sensemaking (Weick, 1995) and the coherence framework (Fullan & Quinn, 2016) served as the conceptual frameworks for this study.

The sample was six elementary school principals of K–5 and K–8 schools charged with implementing the initiative at their school. Data were collected via interviews and archival documents. Thematic analysis was used for emergent themes. Findings for RQ1 indicated four themes regarding how elementary school principals in one district make sense of the content of a district-driven STEM reform initiative to improve overall student academic achievement: a). principals make sense of the content of the STEM reform initiative based on their own background and experiences, b). principals consider teachers' needs when making sense of the reform, c). principals valued collaboration as a part of their sensemaking, and d). principals make sense of the reform expectations through the district's external accountability measures.

The findings were consistent with Weick's sensemaking theory which defines sensemaking as how people create meaning, interpret meaning, and enact meaning with others (Weick, 1995). The sensemaking process influences how well a principal will build coherence around a reform at their school site and how coherence is achieved across the district. Coherence is a collective understanding of the purpose of the work "in the minds and actions individually and especially collectively" (Fullan & Quinn, 2016, p. 16). Findings from this study indicate inconsistency in principal's understanding of the direction and vision of the STEM reform initiative thereby limiting coherence. To develop coherence for the STEM reform initiative across the district, elementary school

principals, with the support of district central office leaders, need shared opportunities to collectively make sense of the reform and then engage in actions to support their staff in making sense of the reform. This type of vertical and lateral partnering could increase principal's ability to serve as a learning leader responsible for clarifying learning goals and shifting practices through capacity building, which could increase internal accountability and ultimately create coherence for the STEM reform initiative across the district.

While research indicates educational reform, is about changing people and not about the define successes and failures of the reform (Corsi, 2020), findings from this study indicate that this district-driven STEM reform effort focuses on external accountability measures rather than the motivating social conditions to implement the reform. Creating coherence for the STEM reform initiative means securing accountability both internally and externally (Fullan & Kirtman, 2019) Although there was evidence of external accountability, increasing the opportunities for principals to make sense of the reform could increase internal accountability, which could increase coherence across the district.

Cultivating a collaborative culture focuses a team on sustained growth and capacity building, which in turn, can lead to a commitment to effective pedagogy, innovation, and clarity on learning competencies (Fullan & Quinn, 2016). Principals could benefit from opportunities to build a collaborative culture and deepen learning. It is particularly essential that district central office leaders support principals in focusing the

direction through a common vision and work to create coherence across the district for the STEM reform initiative.

Findings for RQ2 suggested three themes that elementary school principals consider when using their interpretations of the initiative to lead implementation: a). elementary school principals' developed their unique vision for the STEM reform initiative, b). elementary school principals' confidence in their vision influenced how they lead the STEM reform initiative, and c). elementary school principals selected instructional strategies for teachers to implement based on their unique vision for STEM. Each elementary school principal made sense of the reform through their own backgrounds and experiences, creating a mental model to frame the reform demands within their current context to focus direction. This act of sensemaking indicates that the elementary school principals leading this STEM reform have significant influence over the implementation process at the school site where they lead. Because the relationship between the district central office leaders and elementary school principals is critical for sustained improvement of student achievement, the district central office should consider ways to help principals develop a coordinated set of strategies that would assist principals in serving as the lead change agent at their schools to improve student achievement (Fullan & Quinn, 2016; Honig & Rainey, 2020). Elementary school principals in my study who understood that their role is to impact student achievement as the lead change agent (Acton, 2021) were more likely to implement specific strategies to create change.

Findings were consistent with research which indicated that when principals perceive tasks as significant to teaching and learning, they found the work meaningful

and do not attribute the additional tasks to workload (see Bauer & Silver, 2018; Oplatka, 2017; Reid, 2020). Elementary school principals who saw the STEM reform initiative as an addition to their workload were frustrated with the implementation efforts and expectations, while elementary school principals who saw the STEM reform initiative as their work, focused their efforts on supporting teachers to implement specific instructional strategies. Because principals are responsible for interpreting the reform and communicating and mobilizing staff toward building coherence to improve student achievement, principals would benefit from more coordinated efforts from the district central office leaders to develop the capacities in principals, which are essential for increasing clarity and commitment for the vision and direction of the reform (see Fullan & Quinn, 2016).

Elementary school principals are responsible for making sense of and shaping these external reform demands to fit their local context, which in turn affects the level of success for improving student achievement. I have concluded that professional development targeting a shared vision and cultivating a collaborative culture to deepen learning among district central office leaders, elementary school principals, and site leadership teams could be addressed through a professional development and coaching-cycle project study. Providing collaborative professional learning and coaching where shared sensemaking occurs for district central office leaders, school principals and their site implementation teams could create coherence across the district around the STEM reform initiative to improve persistently low student achievement. Creating opportunities for collective sensemaking processes influences decision making and change among

principals can influence how principals implement change (Brown et al., 2015; Donaldson & Woulfin, 2018; Fullan & Kirtman, 2019).

Section 3: The Project

The problem addressed in this project study was that VUSD experienced inconsistent site implementation, led by the K–5 and K–8 district elementary school principals, of the district-mandated STEM reform initiative. The purpose of this study was to explore how district elementary school principals' sensemaking impacts reform implementation at the site level. The research questions involved the ways the K–5 and K–8 elementary school principals make sense of the content of and implement a district-driven, STEM reform initiative. Data were collected from interviews with six elementary school principal participants and analyzed using thematic analysis for emergent themes.

Findings for RQ1 indicated four themes regarding how elementary school principals in one district make sense of the content of a district-driven, STEM reform initiative to improve overall student academic achievement:

1. Principals make sense of the content of the STEM reform initiative based on their background and experiences.
2. Principals consider teachers' needs when making sense of the reform.
3. Principals valued collaboration as a part of their sensemaking.
4. Principals make sense of the reform expectations through the district's external accountability measures.

Findings for RQ2 suggested three themes that elementary principals consider when using their interpretations of the initiative to lead implementation:

1. Principals' developed their unique vision for the STEM reform initiative.

2. Principals' confidence in their vision influenced how they lead the STEM reform initiative.
3. Principals selected instructional strategies for teachers to implement based on their unique vision for STEM.

Findings indicate a need to develop coherence around the STEM reform initiative among district central office leaders, school principals, and teachers on the site implementation teams (SIT).

As the project in this study, I created a Professional Learning Project that focused on professional learning and follow-up coaching cycles using current research (e.g., Fullan & Quinn, 2016; Honig & Walsh, 2019; Stosich et al., 2018) to build coherence around the STEM reform initiative through shared sensemaking processes. The project consists of 3-days of training at the beginning of the school year followed by quarterly coaching cycles to effectively address the components needed to build coherence around the STEM reform initiative: focusing direction, securing accountability, cultivating collaborative cultures, and deepening learning (see Fullan & Quinn, 2016). Day 1 will include district central office leaders and elementary school principals and will address the role of the principal as a change leader responsible for supporting the process of change through providing a focused direction. Days 2 and 3 will include teachers on the SIT and will address the four components of the coherence framework to develop shared sensemaking around the STEM reform initiative. The Professional Learning Project with follow-up coaching cycles is intended to serve as the foundation for central office leaders to provide quarterly coaching cycles to support elementary school principals responsible

for focusing the direction of the STEM reform initiative and achieving greater coherence. The project was designed to increase the collective understanding of the purpose and vision of the district-driven, STEM reform initiative aimed at improving persistently low student achievement. The 3-day professional learning and follow-up coaching plan was based on the abovementioned themes that developed from the interview and archival data provided by the K–5 and K–8 elementary school principals.

Project Purpose

I intend the project to serve as preservice professional learning at the beginning of the school year with quarterly coaching cycles where district central office leaders provide intensified support for the elementary school principals who have inconsistently implemented the district-driven, STEM reform initiative at their school sites. The Professional Learning Project was designed to improve elementary school principal's change leadership practices to increase the coherence of the district and school efforts to improve student learning through STEM. Specifically, the professional learning and follow-up coaching cycles include processes for a). reflecting on each individual's moral purpose and connecting that moral purpose to the STEM initiative, b). focusing direction by understanding how to be a change leader, c), cultivating collaborative cultures through shared leadership practices and a culture of growth, d). establishing clarity of deep learning goals and precision in pedagogy, and e). developing conditions for maximizing internal accountability (see Fullan & Quinn, 2016).

Project Outcomes

The project outcomes for the 3-day professional learning and quarterly coaching cycles were developed by analyzing the data and reflection of the findings. Elementary school principals will receive training using specific strategies for applying change leadership practices to build coherence around the STEM reform initiative. The first project outcome is developing a focused direction and shared vision among district and site leadership, including site principals and teacher leaders. The second outcome is the development and structure for developing and cultivating collaborative cultures systematically. This includes district central office leaders providing quarterly coaching cycles for elementary school principals as they build the capacity to implement the STEM reform initiative. The third outcome is establishing clarity around the learning goals and process for developing precision in pedagogy to build the capacity of teachers for implementing the STEM reform initiative. The 3-day professional learning and follow-up quarterly coaching cycles aim to increase the coherence around the system-wide reform for improving student achievement through STEM by engaging in shared sensemaking process and developing the foundations of Fullan and Quinn's four components of the coherence framework.

Rationale

The 3-day Professional Learning Project and follow-up coaching cycle goals were a direct result of the review of literature, data analysis, and recommendations from the project study involving elementary school principals implementing a district-driven, STEM reform initiative. As stated in Section 1, the role of the principal is now

increasingly complex and difficult, with elementary school principals leading the instructional vision of the school; maintaining a safe learning environment; building relationships with the community; and ensuring the school follows local, state, and federal policies (Lavigne & Good, 2019; Spillane & Kenney, 2012). Principals are responsible for creating supportive working conditions to meet teachers' specific needs (Lindvall & Ryve, 2019). Attempts to improve student academic outcomes through reform efforts often fail because their school culture lacks the capacity to innovate and modify practices (Riveras-León & Tomàs-Folch, 2020). District and school leaders often focus on the wrong drivers for whole system reform—accountability, individual leadership, technology, and fragmentation (Fullan & Quinn, 2016)—that fail to build coherence around the desired changes. For these reasons, elementary school principals must engage in collective sensemaking processes with district central office leaders, other principals, and teacher leaders to build system-wide coherence around the district-driven STEM reform. Therefore, Fullan and Quinn's (2016) coherence framework could be used to provide clear guidance for district central office leaders to create better coherence of the reform initiative by helping site leaders focus on the right drivers for implementing and sustaining whole-system change.

Review of the Literature

Initiatives often lack coherence because they are rarely implemented as intended and, as a result, do not achieve the desired goals (Kirsten, 2020; Lindvall & Ryve, 2019; Peurach et al., 2019; Sullanmaa et al., 2019). My study's findings indicate that the elementary school principals in this study do not have a common vision nor are they

consistently enacting common actions to achieve the goals of the STEM reform initiative. In essence, the district-driven STEM reform initiative lacks coherence. Creating coherence is an ongoing process where district central office leaders intentionally structure opportunities for people within the organization to innovate and engage in continuous improvement (Fullan & Kirtman, 2019). Sustained system improvement takes years of hard work with supports and structures to motivate and build the capacity of educators (Harris, 2012). District leadership teams that carefully coordinate collaborative professional learning between district central office and school leaders can strengthen the connection between professional learning and improvement initiatives to impact lasting change (Forman et al., 2017).

Elementary school principals can have a significant positive impact on the organization and culture of the school (Leithwood et al., 2020). Principals' ability to develop a strong culture can positively impact coherence making through focusing direction, cultivating collaborative cultures, deepening learning, and securing accountability (Fullan & Quinn, 2016) around reform efforts over time to build coherence. Principals need job-embedded learning opportunities that build principal's capacity to lead for coherence (Ford et al., 2020). A coordinated set of strategies is essential for building principals' effectiveness to lead change through educational reforms at their schools (Fullan, 2019; Honig & Rainey, 2015; Mania-Singer, 2017). Principals, like teachers, need on going, collaborative, professional learning that is purposeful and increases their knowledge and skills to improve student academic achievement (Killion & Roy, 2009).

Focusing Direction

The findings from this study indicate that each elementary school principal maintains their own vision for the STEM reform initiative and makes decisions for implementation through this vision, which leads to inconsistent implementation of the STEM reform. To develop coherence, district central office leaders must focus direction by developing a "shared moral purpose and meaning as well as a pathway for attaining that purpose" (Fullan & Quinn, 2016, p. 17). Developing a clear vision and setting goals, expectations, and direction has long been part of the narrative of educational research literature (Leithwood et al., 2020; Robinson & Gray, 2019). The idea of coherence or clarity requires shared sensemaking among stakeholders to develop a common focus and purpose for change (Pietarinen et al., 2019).

District leadership matters, according to Lawson et al. (2017). Their case study of six schools indicated that the trust-communication connection is fundamental for implementing an innovation successfully. In their study, respondents indicated that effective communication is critical for building relational trust across the district. Trust between principals and the superintendent as well as between teachers and the superintendent were identified as essential for sustaining innovation and the implementation of educational reform efforts. Trust and communication were sustained at these schools in Lawson et al.'s study through regularly structured formal and informal meetings where discussions about curriculum instruction, professional development, and technology occurred between principals and district central office leaders, thereby increasing principals' feeling of support for their leadership. Investing in this type of

system-wide communication structure can support district central office leaders in focusing direction, one component for creating coherence, because the process creates an opportunity to build a collaborative approach to change and models what Fullan and Quinn (2016) identify as change leadership within the coherence framework.

In the current study, elementary school principals were not fully aware of how their leadership and decision making impacts the reform implementation. Principals implementing a district-wide reform initiative must recognize their role and influence in creating the conditions conducive to innovative practice among teachers. Effective organizational leaders use the relational approach to ensure all employees understand the organizational vision and demonstrate the capacity to enact this vision through their position (Eacott, 2019). To focus the direction of a new reform initiative, school leaders must develop a strong culture where core values and beliefs are widely shared and embraced by the principal and teachers (Tamir & Ganon-Shilon, 2021). Essentially, effective leaders are change leaders who strategically develop the conditions to support others in building their capacity to sustain change over time to create greater coherence around educational reform (Eacott, 2019; Fullan & Quinn, 2016; Tamir & Ganon-Shilon, 2021). By sustaining the process of change, leaders can focus directly on the organizational vision and enact that vision. While visioning alone is not enough to create coherence around a reform, Fullan and Quinn (2016) suggested implementing through actions and then using what is learned from implementation to refine practices and ground the vision in practice over time.

Cultivating Collaborative Cultures

Collaboration between district central office leaders, principals, and teachers can further support the development of a focused direction for the STEM reform initiative, which is being implemented inconsistently across school sites at VUSD. One of the coherence framework components is cultivating collaborative cultures, which is essential to increasing trust and engagement around the reform being implemented (Fullan & Quinn, 2016). Learning seldom occurs in isolation. Hargreaves and O'Connor (2018) argued that the positive effects of professional collaboration have become irrefutable, leaving educational leaders to address how and how well educators actually collaborate. Findings from the current study indicated elementary school principals valued the collaboration with their teacher leaders through the SIT, so to create coherence for the initiative across all sites, all principals and SIT members need opportunities to collaborate and make collective sense of the reform.

Brezicha et al. (2020) indicated that a collaborative culture can positively impact teacher's job satisfaction. The ability to engage in shared decision making has a greater impact on teachers than any other school characteristic so long as their participation influences decision making. Because individuals' sensemaking influences how they receive, interpret, and enact messages (Coburn, 2005), it is essential that professional development opportunities afford shared decision making opportunities and common opportunities for reflection and refinement. The context for how adults learn is directly impacted by the context in which learning takes place and the opportunities for social construction of meaning making (Merriam, 2008). Thus, district central office leaders can

promote collaboration and learning between themselves, principals, and teachers to address challenges and inspire innovation for the STEM reform initiative district wide.

Collaboration among stakeholders is essential for developing a shared moral purpose and meeting the needs of adult learners (Foley, 2004; Fullan & Quinn, 2016). Because elementary school principals in the current study consider teacher needs when making sense of the reform, creating sustained and structured collaboration can accelerate the shared sensemaking to increase coherence around the reform. Ganon-Shilon and Schechter (2019) defined reform implementation as a social activity because sensemaking within policy implementation must occur among all members of the district who are impacted by the reform implementation. Their findings indicated that district central office leaders must focus on professional development that builds capacity to sustain long-term school improvement at the beginning of the reform process. These findings aligned with research regarding effective adult learning strategies that promote learning in the context of its real-world application as well as collaborative structures that encourage reflection and dialogue (Foley, 2004; Merriam, 2008).

Deepening Learning

While developing a collaborative culture between teachers and principals can increase trust and sustain long-term reform changes, it can also support collective learning and the opportunity to deepen learning for all stakeholders. As I stated in Section 1, deepening learning is the commitment to effective pedagogy, innovation, and clarity on learning competencies. Deepening learning means identifying specific pedagogical actions steps “directed to the improvement of the learning-teaching process” (Fullan &

Quinn, 2016, p. 79) to improve academic outcomes for students. District central office leaders, principals, and teachers that engage in collaboration as the process for developing shared sensemaking while deepening learning create collective clarity of the learning goals needed to achieve the reform's vision. Because elementary school principals in my study were more likely to implement strategies if they were confident in their vision for the reform, deepening learning can accelerate principal decision making and potentially increase the shared decision-making opportunities between principals, teachers, and district central office leaders.

Ganon-Shilon and Chen (2019) developed a school sensemaking process, explaining that principals need to collaborate with their teachers through dialogue and discussion to make sense of educational reforms as a collaborative process to improve teaching and learning. They suggested that principals and teachers first implement "ambiguous reform demands" (Ganon-Shilon & Chen, 2019, p. 79) and need opportunities to collaboratively reflect on implementation before coming up with a plan that enables a collaborative construction and enactment for making meaning of the reform. While learning has traditionally been viewed as in individual process, learning is a social and relational process where the people, context, and environment influences learning (Foley, 2004). Developing leadership learning communities among principals and teachers is a cyclical process that creates opportunities to learn from each other and develop new knowledge into effective pedagogical practice for the context for which it is intended (Lowenhaupt et al., 2016). Improving student academic achievement outcomes necessitates the successful implementation of educational reforms. For the reform to be

implemented successfully, elementary school principals and teachers need opportunities to improve and refine practices through shared sensemaking that builds their capacity to implement STEM effectively.

Securing Accountability

Elementary school principals in my study acknowledged and implemented based on the external accountability measures, but there was little evidence of strong internal accountability. Internal accountability occurs when there is a collective responsibility for improving and refining instructional practice to ensure success for all students (Fullan & Quinn, 2016). Elmore (2004) argued that successful schools develop a collaborative culture that encompasses individual responsibility and collective expectations, and that internal accountability must precede any measure of external accountability to achieve success. Essentially, internal accountability, or collective efficacy, is the driver for lasting change. Collective efficacy is the belief among group members can execute actions to achieve their goals (Goddard et al., 2017). Internal accountability is driven by a component of adult learning because learning is a process where the learner's emotions, identity, and drive are formed by adapting to the learning context and community (Foley, 2004). Internal accountability is more effective than external accountability in that high levels of relations trust among a group of colleagues can influence outcomes and "compel members to action in pursuit of desired organizational attainments" (Goddard et al., 2017, p. 223). Principal's efficacy beliefs can significantly influence collective efficacy, the school improvement process, and student achievement (Versland et al., 2017).

Additionally, schools with high levels of collective efficacy and trust develop high levels of teacher leadership, which can have significant student achievement (Flood & Angelle, 2017). While securing accountability must include both internal and external measures, it is essential to note that building coherence around a reform begins with a strong foundation of focused direction and motivating internal factors or moral purpose. Principals can use their influence develop a strong moral purpose and collective efficacy by securing professional development opportunities for teachers, communicating clear expectations, and fostering positive relationships (Qian & Walker, 2019). Principals who develop this type of internal accountability do not ignore the external accountability measures but engage with the system to strengthen the vision, build more effective collaboration, and deepening learning (Fullan & Quinn, 2016).

Professional Learning as a System of Support

Historically, professional learning was a fragmented system of workshops often disconnected from educators' day-to-day practice (Forman et al., 2017). Traditional professional development workshops have far more impact when they are coupled with follow-up coaching and support on-site (Harris & Jones, 2019; Snyder et al., 2018). For professional learning to impact change, there should be a mechanism for feedback, modeling, observations, and small group learning (Kretlow & Bartholomew, 2010). Under the 2015 reauthorization of the Every Student Succeeds Act (2015), professional development is defined as "sustained, intensive collaborative, job-embedded, data-driven, and classroom-focused" (p. 295). Sustained, job-embedded professional learning for principals is essential for building their capacity to serve as instructional leaders. Honig

(2012) suggested that district central office leaders should be directly responsible for supporting the principal's instructional leadership capacity through a coaching and support system to further the district vision for student learning.

Forman et al. (2017) indicated that a foundational learning experience should support educators in thinking about the school or district system rather than individual classrooms. This shared foundational learning experience can elicit different perspectives, creating a more accurate picture of how the system is working and the organizational capacity for instructional improvement. Educators should engage in personal reflection about one's perceptions before engaging with others on the team as they map out the organization's initiatives and the degree to which they are being implemented (Forman et al., 2017). The professional learning that I created for this study is designed to provide a foundational learning experience to support the on-going quarterly coaching cycles using Fullan and Quinn's (2016) coherence framework to design an effective professional learning system.

To support adult learning in the professional development content, I chose an andragogical approach (see Gravani, 2015). My study's findings indicated that elementary school principals value collaboration because of the opportunities to collectively make sense of the STEM reform and engage in joint decision making with their teacher leaders. The Professional Learning Project I created is intended to serve as a foundation for elementary school principals and SIT team to focus direction and improve coherence around the STEM reform initiative as they continue their monthly leadership

meetings and led the work at their sites. Clarity about the purpose of collaboration is key for collaborative work impact student learning (Harris & Jones, 2019).

The role of the principal is central to bringing about lasting change that improves teaching and learning (Ganon-Shilon & Schechter, 2017b; Leithwood et al., 2020). My study's findings indicate that the elementary school principal's confidence in their vision influenced how they each lead the STEM reform initiative. Principals need on going leadership coaching and support to build their capacity to lead the STEM reform initiative effectively. I developed the follow-up quarterly coaching cycles to address this need. Principals who received job embedded coaching found the collaboration and reflection processes were helpful and that the process improved their abilities as a principal (Wise & Cavazos, 2017).

Leadership coaches that work with principals can support whole school reform by building the capacity of principals to engage in systems thinking (Lochmiller, 2018; Shaked & Schechter, 2016). Bush-Mecenas et al. (2020) found that principals who received high quality coaching from a principal supervisor had a more substantial impact on reform implementation than those who received no coaching. The findings indicate that high quality coaching for principals positively impacts policy and reform implementation. High quality coaching for this study was defined as coaches who use a range of strategies and engage in a nondirective approach to coaching versus a directive approach (Bush-Mecenas et al., 2020). District directors responsible for coaching principals should continue to work with an outside provider to deepen their leadership coaching skills and apply adult learning principles (Gravani, 2015). Furthermore, leaders

who experience leadership coaching improve their leadership behaviors and social competencies to effectively lead and build the capacity of those they supervise (Anthony, 2017).

The professional learning system developed as a result of the findings of this study serves to address the needs of principals as adult learners who require learning experiences based on their background, knowledge, and skills. Additionally, the Professional Learning Project experiences designed to create coherence around the STEM reform initiative were established with the following adult learning theory principles: a). self-directed learning, b). experiential, c). goal-focused, d). relevant to participant needs, e). practical in design, and f). collaborative in design (see Roessger, 2015). While the professional learning creates a shared foundation for implementing the STEM reform initiative, the coaching cycles allow elementary school principals to address their specific site culture and needs to bring clarity and improve efficacy (see Mackay, 2017).

The Professional Learning Project and follow-up coaching cycles developed as a result of this study are two components of the professional learning system to support elementary school principals in implementing of the STEM reform initiative. As articulated in the findings, principals currently engage in a monthly leadership academy led by an outside provider, which includes collecting data during instructional rounds using strategy focused rubrics. Elementary school principals also collaborated with district level TOSAs from the professional learning department to plan and design site and teacher specific professional learning. Moreover, elementary school principals

collaborate monthly with their SIT teacher leaders to engage in joint decision making using the school data regarding student achievement. Each component creates opportunities for coherence making that maintains a focus on improving student achievement through the STEM reform initiative. Coherence making is never done. Rather building coherence is an on-going process grounded in a collaborative process that compels deep learning and strengthens the focused direction (Fullan & Quinn, 2016).

Summary

Coherence can be developed through a collective and sustained commitment over time. Accountability alone is not enough; the focus and collaboration must be directed at improving teaching and learning (Fullan & Quinn, 2016). Principals need to engage in ongoing professional learning that builds their capacity to lead change and allows for collaboration and reflection. As the lead learner at the school site, the principal is responsible for encouraging a collaborative working environment where teachers are encouraged to share effective practices and pedagogy (Smith et al., 2020). Noonan (2019) reported that professional development, as viewed by teachers, stakeholders, principals, and policymakers, is an effective means for improving student academic achievement. Leadership practices, workplace conditions, and policies specific to the local conditions can foster and promote professional learning communities and learning (Keung et al., 2020). By engaging in a collaborative model of professional learning between district central office leaders, site principals, and teacher leaders, elementary school principals can positively influence this system wide approach to continuously building coherence around the STEM reform initiative.

Project Description

The project consists of a 3-day professional learning and follow-up quarterly coaching cycles. The 3-day professional learning will take place during preservice before the start of the school year with district directors leading principals through quarterly coaching cycles. Traditionally, this district provides a 2- to 3-day preservice for administrators, with one or more days including teacher leaders from each site. Day 1 begins with the inclusion of elementary school principals and district central office leaders to improve principal's change leadership practices and mindset to increase the coherence of the district and school efforts to improve student learning through STEM. Days 2 and 3 include elementary school principals, district central office leaders, and teacher leaders on each site implementation team (SIT). These 2 days will include processes for a). reflecting on each individual's moral purpose and connecting that moral purpose to the STEM initiative, b). understanding how to be a change leader, c). cultivating collaborative cultures through shared leadership practices and a culture of growth, d). establishing clarity of deep learning goals and precision in pedagogy, and e). developing conditions for maximizing internal accountability. Additionally, the Professional Learning Project is intended to build a foundation for district central office leaders to engage elementary school principals in quarterly coaching cycles that support implementing the STEM reform initiative throughout the year. The outcome for the Professional Learning Project and follow-up coaching cycles is to increase the coherence around the system-wide reform for improving student achievement through STEM through the development of a shared vision for STEM.

The purpose of the 3-day professional learning and the quarterly coaching cycles is to improve elementary school principal's change leadership practices to increase the coherence of the district and school efforts to improve student learning through STEM. The professional learning is also intended to lay the foundation for all STEM professional learning and coaching for the year. Additionally, this collaborative, jointly determined vision should be revisited, supported, and sustained through a task force with stakeholders throughout the organizational ladder to strategize and provide leadership to STEM. District central office leaders will also commit to coaching and supporting elementary school principals and their site leadership teams in implementing and sustaining the shared vision to maintain coherence around the reform initiative through quarterly coaching cycles. Fullan and Quinn (2016) explained that this type of sustained system collaboration increases clarity around the strategies and goals and provides continued learning opportunities that allow for sensemaking to increase capacity and focus on student learning at all levels of the organization. Cultivating the engagement of multiple stakeholders over time is essential for district central office leaders seeking to sustain such a systemic reform implementation process. To increase coherence around the STEM reform initiative, this project aims to develop a professional learning system that addresses the needs of the adult learners through modes of professional learning designed to meet the needs of the individual learner.

Project Evaluation Plan

Following Guskey's (2002) five critical levels of professional development evaluation, I plan to use multiple evaluation methods to evaluate the effectiveness and

support decision-making about future professional learning. Guskey's (2002) five levels include a) participants' reactions, b) participants' learning, c) organization support and change, d) participants' use of new knowledge and skills, and e) student learning outcomes. The first three levels of professional learning evaluation determine the effectiveness of the professional learning, while the final two levels serve to evaluate the effectiveness of STEM reform initiative over time. Evaluating professional learning provides meaningful information to determine if the professional learning achieved its intended results in building coherence around the reform initiative.

To evaluate participants' reactions and learning, participants will provide feedback and reflect on their learning at the end of each professional learning day and after each coaching cycle through a short digital feedback survey. The survey will measure participants' initial satisfaction with the professional learning and will allow participants to reflect and communicate their understanding of the new knowledge and skills. Participants will also provide feedback on their learning through each intentionally designed learning activity or coaching cycle where information is gathered through written responses and oral reflections. These digital feedback surveys completed by the participants will be used to refine the next day's professional learning session or coaching cycles and determine future needs for creating coherence.

Evaluating organization support and change addresses the processes, policies, and elements necessary for the change to be successful (Guskey, 2002). Feedback from elementary school principals regarding the district central office leaders' commitment to change serves to evaluate the district's advocacy, support, and recognition for change as a

part of the STEM reform initiative over time. Participants will be given an evaluation 3-weeks after the professional learning to assess whether the professional learning activities fostered changes that align with the vision for the STEM reform initiative. Guskey's (2002) five levels of evaluation suggests that the following questions should be used when seeking feedback from elementary school principals regarding district central office leader's support for change:

1. How was implementation facilitated and supported by the district?
2. Was the support overt and public? Please explain.
3. Were problems addressed quickly and efficiently? Please explain.
4. Were sufficient resources made available? Please explain.
5. How were successes recognized and shared?
6. How did professional learning affect the district's climate and procedures?

This summative evaluation will identify the perceived level of support from the district leaders and determine the needs for future changes that will develop greater coherence around the STEM reform initiative.

Additionally, I recommend that the district central office leaders define the critical aspects of the changes expected for implementing the STEM reform, such as the use of the STEM curriculum, the specific instructional strategies, the development and sustainment of collaborative cultures, and the availability of resources to create an innovation configuration map for each component of the STEM reform expectations. An innovation configuration map serves to clarify the parameters of the new program, define quality, indicate the degree to which the reform is being implemented, and provides a

blueprint for the requirements for implementation (Roy & Killion, 2011). Principals and teachers should vet this innovation configuration map as a part of the collective sensemaking processes before being fully implemented as an additional STEM reform evaluation tool. The innovation configuration map will serve as an evaluation tool for the coaching cycles. Principals can use the tool to reflect on their current level of innovation, and coaches can work with elementary school principals to develop actions steps to move toward full implementation.

The fifth level of evaluation, student learning outcomes, focuses on the core purpose of the STEM reform initiative and finds evidence that the reform initiative is improving student learning over time (Guskey, 2002). This level of evaluation serves to find evidence that the STEM reform initiative, from design and implementation to sustaining systemic change by assessing the reform's overall impact. Regarding the professional learning, this fifth level of evaluation answers the question, how did professional learning benefit students? Student learning will continue to be evaluated using the academic achievement indicators identified in the STEM grant, the CAASPP, scores in English language arts, mathematics, and science, as well as the number of students enrolled in and passing advanced placement and international baccalaureate exams in high school.

Project Implications for Social Change

The findings from this study may change how district leaders approach the learning of elementary school principals in the school district under study. The ways that elementary school principals make sense of and implement the STEM reform initiative at

their schools are influenced by their opportunities for collaborative sensemaking. This project may improve the overall quality and depth of the district-provided professional learning for elementary school principals and other key stakeholders. While there are currently opportunities in the district under study for elementary school principles to engage in professional learning, findings indicate the training and support are often disjointed from work at the school sites. Little opportunities currently exist for jointly determined decision making and collective sensemaking. As adults, elementary school principals need a system of support to implement changes, engage in decision making, and reflect on their practice, which can be accomplished through the Professional Learning Project of job embedded collaborative professional learning and on site coaching cycles. Implementing the recommended Professional Learning Project and follow-up coaching cycles system of support can build coherence for lasting changes that will improve student learning in the classroom.

Section 4: Reflections and Conclusions

The purpose of this qualitative case study was to explore how district elementary principals' sensemaking influences their implementation of a STEM reform initiative within the VUSD to improve student academic achievement overall. The conceptual framework of this qualitative study was based on Weick's (1995) theory of sensemaking in organizations and the coherence framework (Fullan & Quinn, 2016), which focuses leaders on the right drivers to implement effective and lasting change. I analyzed participant interview and archival document data using initial and axial coding to identify recurring themes and patterns. The findings indicated a need for a common vision and consistency in enacting common actions to achieve the goals of the STEM reform initiative. The implications for positive social change include providing elementary school principals and district central office leaders with a better understanding of what principals need to make sense of to implement reform initiatives that focus on deep learning for all students.

Project Strengths and Limitations

Strengths

The purpose of the Professional Learning Project and follow-up coaching cycles is to increase the coherence around the district-wide STEM reform for improving student achievement by engaging elementary school principals in shared sensemaking process and practices, building a shared vision, and providing sustained leadership coaching. In this study, I explored how district elementary school principals' sensemaking impacts reform implementation at the site level. I selected a professional learning project to

increase the collective understanding of the purpose and vision of the district-driven, STEM reform initiative aimed at improving persistently low student achievement.

A review of the current research supported the need for professional learning that engages elementary school principals in collective sensemaking around the reform initiative. Although recent researchers have identified that principals serve as change agents in the implementation of education reforms (Acton, 2021; Schechter & Shaked, 2017; Spillane & Kenney, 2012), there is little known about elementary school principals' sensemaking processes when interpreting and implementing educational reforms at their schools (Ford et al., 2020; Spillane & Anderson, 2014). One strength of this project is that this project employs the four components for developing coherence around a district-wide reform initiative: focusing direction, cultivating collaborative cultures, deepening learning, and securing accountability. Another strength of this project is the inclusion of the ways in which district central office leaders should support elementary school principals with professional learning that allows for collaboration with teacher leaders and district office leaders to support innovation and engage in continuous improvement (Fullan & Quinn, 2016). One strength of the project is that the professional learning includes specific activities to engage key stakeholders in shared sensemaking around the reform over time.

Limitations

Limitations of the project include the necessity for district central office leaders, elementary school principals, and teacher leaders to commit to attending and engaging in the professional learning sessions. Another limitation may be the commitment necessary

for all involved to build and sustain a system of innovation, visioning, and shared sensemaking. While the professional learning is meaningful and timely, it is only the foundation for developing a collaborative approach to creating and maintain coherence around the STEM reform initiative. District central office leaders may not be fully committed to sustain the coaching cycles and support system needed to build relationships and work alongside elementary school principals year round, a strategy that is critical for sustained reform implementation.

Recommendations for Alternative Approaches

While I selected the Professional Learning Project and follow-up coaching cycles as the most appropriate project based on the findings of this study, there are alternative approaches for addressing the problem. The problem could have been addressed through the development of focus groups, conducting observations, or interviewing district central office leaders to explore the supports that are in place for principals responsible for implementing the reform initiative at their site. Developing a full coaching frame and system for district central office leaders to coach principals through reform implementation is another alternative approach. An additional option could have been to interview teachers to understand their perceptions of the reform implementation process and leadership at their school sites.

Scholarship, Project Development and Evaluation, and Leadership and Change

Scholarship

During this project study, I developed my skills as a researcher learning how to effectively conduct qualitative research to become a scholar of change. As a scholar of

change, I was committed to developing and refining my skills as a qualitative researcher. Engaging in the research process was a part of my commitment toward ongoing professional growth so that I can most effectively impact the educational system where I work. As a scholar, I learned how to read, understand, and analyze research. This process allowed me to grow as an instructional leader as I learned by doing. As a change leader, I have learned how to make decisions grounded in research and practice and have developed a better understanding of what it truly means to build coherence around systems change to positively impact student learning.

This process has given me a deeper understanding of the importance of building and sustaining relationships and of the effective practices for eliciting and sustaining change aimed at improving student outcomes in any educational system. Through continuous research, I increased my understanding of effective leadership practices and the effects of these practices on improving teaching and learning. I now have a deep understanding of how essential it is to build relationships and have a collective vision, and a deep commitment to learning at all levels within any organization. Learning how to research has empowered me to apply these skills in my current role as an elementary principal to affect positive change for students.

Project Development and Evaluation

I began this project study because I saw a need to support the implementation of an educational reform to improve teaching and learning and equip students for their futures. I was genuinely interested in understanding how people come to their own unique understanding of the same work and how to focus stakeholders in one unified

direction to improve teaching and learning. As a professional learning director at the time, my work was about intentionally interrupting the practices of others to improve teaching and learning. As I began reading current research, I became aware of Weick's (1995) sensemaking theory, which provided a lens for understanding how others come to develop their interpretations of a new event, idea, or concept. The idea of exploring principal's sensemaking evolved from Weick's theory and the need to identify effective practices for implementing educational reform as a system.

Key to a project's development is the evaluation of the project regarding its effectiveness for eliciting the desired change. Continuous improvement is a cyclical process and feedback from stakeholders throughout the learning cycles is key to ensuring that they understand the vision and the actions for enacting that vision (Eacott, 2019). Like the interviews from the participants in the study, the feedback gathered from participants in the professional learning project will be used to guide and refine future professional learning to ensure that the activities meet the sensemaking needs of the learners. For this project study, the evaluation process is integral for developing coherence around a reform initiative.

Leadership and Change

When I started this project, I was working as the director of professional learning in the district where my study was conducted. Just before collecting data, I moved districts and changed positions to become an elementary principal. This change in my professional role was inspired by my research on the role of the principal and the impact it can have on improving teaching and learning. During this time, the world was also

impacted by the COVID-19 pandemic, which fueled my decision to move to a leadership role where I could most directly impact teaching and learning at a time when changes were occurring daily and sometimes minute by minute. As a change agent, I take this responsibility very seriously and was propelled to apply my leadership skills for supporting and sustaining systems changes where I felt I could most positively impact student outcomes.

While I do not have all the answers, I have embraced the role as a change agent and lead learner. I am eager to continue to learn and to apply my learning to new situations every day. As a principal, understanding the change process and how people make sense of change is pivotal for developing coherence among all stakeholders for the betterment of students. Being a highly effective leader means committing to listening to others' perspectives, developing a clear plan of action, and adapting along the way. The job of a leader is never finished; it is always about learning, growing, and leading.

Reflection on Importance of the Work

I started this study as a part of my commitment to lifelong learning. Through this study, I have transformed my thinking as a leader and a scholar. The most empowering aspect of this journey are the skills I developed regarding effective research processes and data collection and analysis methods. These skills have already impacted my decision making as an educational leader. While I started this process seeking to explore sensemaking, I have learned so much about systems thinking and the positive impact that educational leaders can have on improving student outcomes. The research process has

made me a stronger leader because I have refined my skills in making decisions grounded in research and evidence and have learned methods for leading whole-systems change.

As I shared above, this journey impacted my leadership so much so that I changed leadership positions. To take what I have learned and put it into action as an elementary principal exemplifies my commitment to be an agent of change. My journey through this project and coursework at Walden empowered me to be intentional about the ways in which I can cultivate a school culture focused on a clear direction for improving student achievement. I began teaching more than 20 years ago because I wanted to make a difference for students in my community and this project has grown my skillset to be more effective in working toward closing the opportunity gap for all students.

Implications, Applications, and Directions for Future Research

Implications

This project may influence positive social change by influencing how leaders in any district across the United States might build a system of support for their school principals to better implement change efforts across all schools. Understanding how principals make sense of reform and how this sensemaking influences their actions could provide insights into the elements needed to implement any reform successfully. Principals who can engage in shared sensemaking through a system of professional learning tend to feel more supported by district central office leaders and more prepared to work with their teachers to improve student learning. Additionally, principals could begin to see themselves as a part of the larger district system and understand their responsibility for working toward a shared vision and purpose. The project may influence

the way district leaders value and structure professional learning and could engage principals throughout a district in sensemaking and reflection on their actions to improve teaching and learning.

Another positive social change implication could be the development of collaborative cultures at school sites where teachers and principals are intentionally included in the decision-making model with the district leaders. Developing a system that allows stakeholders to make sense of change individually and collectively can positively impact and sustain educational change. When principals are clear on the direction and vision of the district, they can better implement and sustain change at their school site. With the collective commitment to focus on one direction, student achievement can be positively influenced, which could increase teacher and principal job satisfaction and retention rates. When teachers and principals have higher job satisfaction, they are more likely to say in their position, which can increase knowledge and skill development for students and teachers.

District central office leaders seeking to sustain a systemic reform implementation process for any planned or future educational reforms should cultivate the engagement of multiple stakeholders over time through joint actions and activities designed to increase trust and collective responsibility for improving teaching and learning. This project serves to develop a professional learning system that addresses the requirements of the adult learners through modes of professional learning designed to meet the individual learners' needs over time. When district leaders meet the needs of the adult learners,

stakeholders' commitment is increased toward attaining a shared vision for improving student learning outcomes.

Applications

This Professional Learning Project and follow-up coaching cycles system of support can be applied to any professional development being implemented to elicit lasting educational change over time. I developed the professional learning system based on the findings of this study, and it serves to address the needs of elementary school principals as adult learners who require learning experiences based on their background, knowledge, and skills. The systems thinking components of the professional learning project allows for teacher leaders, principals, and district leaders engaged in any reform effort to participate in jointly determined decision making and coherence making to improve student achievement collectively. Coherence can occur when there is a collective commitment over time toward a shared goal of improving student learning outcomes. If this commitment to long-term, systemic professional learning is embedded into the culture of this or any other district, professional learning may improve and begin to impact teaching and learning systematically and positively.

Directions for Future Research

My recommendations for future research at the local level include exploring district central office leaders' and/or teachers' sensemaking and implementation processes during reform implementation efforts to understand implementation from multiple perspectives. I also recommend that district central office leaders explore additional strategies to provide more systemic and aligned professional learning that

allows for shared sensemaking and jointly determined decision making around the reform efforts. Another recommendation is that future research be conducted in other schools or districts seeking to implement reform beyond the principal's oral interpretations of their reform efforts. Future research could explore specific activities that principals engage in to make sense of and implement changes within their school settings. These activities could be measured using an innovation configuration map or some other objective measure to evaluate how principals implement reform changes within their school sites.

Conclusion

In this study, I focused on elementary principals' sensemaking and their influence on implementing educational reforms to positively impact student achievement. Through the literature review and data collection and analysis, it has become evident that without intentional and ongoing support for elementary school principals to build their collective capacity for implementing and sustaining reform, lasting change will not likely occur within the educational system. Research supported the need for professional learning that engages principals in developing clarity and a collective commitment to work toward that vision (Honig & Rainey, 2015; Leithwood, 2013). Understanding that learning is truly a lifelong process will equip district central office leaders to provide professional learning that builds the capacity of principals to positively impact student achievement.

References

Acton, K. S. (2021). School leaders as change agents: Do principals have the tools they need? *Management in Education, 35*(1), 43–51. https://doi.org/10.1177/0892020620927415

Anthony, E. L. (2017). The impact of leadership coaching on leadership behaviors. *Journal of Management Development, 36*(7), 930–939. https://doi.org/10.1108/JMD-06-2016-0092

Bauer, S. C., & Silver, L. (2018). The impact of job isolation on new principals' sense of efficacy, job satisfaction, burnout, and persistence. *Journal of Educational Administration, 56*(3), 315–331. https://doi.org/10.1108/JEA-07-2017-0078

Brezicha, K. F., Ikoma, S., Park, H., & LeTendre, G. K. (2020). The ownership perception gap: Exploring teacher job satisfaction and its relationship to teachers' and principals' perception of decision-making opportunities. *International Journal of Leadership in Education, 23*(4), 428–456. https://doi.org/10.1080/13603124.2018.1562098

Broer, M., Bai, Y., & Fonseca, F. (2019). *Socioeconomic inequality and educational outcomes: Evidence from twenty years of TIMSS* (Vol. 5). Springer International. https://doi.org/10.1007/978-3-030-11991-1

Brown, A. D., Colville, I., & Pye, A. (2015). Making sense of sensemaking in organization studies. *Organization Studies, 36*(2), 265–277. https://doi.org/10.1177/0170840614559259

Burkholder, G. J., Cox, K. A., & Crawford, L. M. (Eds.). (2016). *The scholar-*

practitioner's guide to research design. Laureate.

Burriss, K. G., & Ring, T. (2008). Communication dynamic as it influences program implementation. *National Association of Laboratory Schools Journal*, *31*(2), 7–17.

Bush-Mecenas, S., Marsh, J., & Strunk, K. (2020). Guiding principals: Middle-manager coaching and human-capital reform. *Teachers College Record, 122*(10), 1–50.

California Department of Education. (n.d.). *California school dashboard*. https://www.caschooldashboard.org/

Coburn, C. E. (2005). Shaping teacher sensemaking: School leaders and the enactment of reading policy. *Educational Policy, 19*(3), 476–509. https://doi.org/10.1177/0895904805276143

Colville, I., Brown, A. D., & Pye, A. (2012). Simplexity: Sensemaking, organizing and storytelling for our time. *Human Relations, 65*(1), 5–15. https://doi.org/10.1177/0018726711425617

Commission on Teacher Credentialing & California Department of Education. (2014). *California professional standards for education leaders* (CPSEL).

Corsi, G. (2020). 'Education has no end': Reconciling past and future through reforms in the education system. *Educational Philosophy and Theory*, *52*(6), 688–697. https://doi.org/10.1080/00131857.2019.1707658

DeCino, D. A., & Waalkes, P. L. (2019). Aligning epistemology with member checks. *International Journal of Research & Method in Education*, *42*(4), 374–384. https://doi.org/10.1080/1743727X.2018.1492535

Denzin, N. K., & Lincoln, Y. S. (2013). *The landscape of qualitative research* (4th ed.). SAGE. http://www.sagepub.com/sites/default/files/upm-binaries/17670_Chapter1.pdf

Donaldson, M. L., & Woulfin, S. (2018). From tinkering to going "rogue": How principals use agency when enacting new teacher evaluation systems. *Educational Evaluation and Policy Analysis*, *40*(4), 531–556. https://doi.org/10.3102/0162373718784205

Eacott, S. (2019). High-impact school leadership in context. *Leading & Managing*, *25*(2), 66–79.

Elmore, R. (2004). *School reform from the inside out: Policy, practice, and performance*. Harvard University Press.

Erickson, F. (2011). A history of qualitative inquiry in social and educational research. In N. K. Denzin, & Y. S. Lincoln (Eds.), *The SAGE handbook of qualitative research.* (4th ed., pp. 43–58). SAGE.

Farrell, C. C., & Coburn, C. E. (2017). Absorptive capacity: A conceptual framework for understanding district central office learning. *Journal of Educational Change*, *18*(2), 135–159. https://doi.org/10.1007/s10833-016-9291-7

Flood, L. D., & Angelle, P. S. (2017). Organizational influences of collective efficacy and trust on teacher leadership. *International Studies in Educational Leadership*, *45*, 85–115.

Foley, G. (Ed.). (2004). *Dimensions of adult learning: Adult education and training in a global era.* Open University Press.

Ford, T. G., Lavigne, A. L., Fiegener, A. M., & Si, S. (2020). Understanding district support for leader development and success in the accountability era: A review of the literature using social-cognitive theories of motivation. *Review of Educational Research*, *90*(2), 264–307. https://doi.org/10.3102/0034654319899723

Forman, M. L., Stosich, E. L., & Bocala, C. (2017). *The internal coherence framework: Creating the conditions for continuous improvement in schools*. Harvard Educational Press.

Fullan, M. (2019). *Nuance: Why some leaders succeed, and others fail*. SAGE.

Fullan, M., & Kirtman, L. (2019). *Coherent school leadership: Forging clarity from complexity*. ASCD.

Fullan, M., & Quinn, J. (2016). *Coherence: The right drivers in action for schools, districts, and systems*. SAGE.

Gammelgaard, B. (2017). The qualitative case study [Editorial]. *The International Journal of Logistics Management*, *28*(4), 910–913. https://doi.org/10.1108/IJLM-09-2017-0231

Ganon-Shilon, S., & Chen, S. (2019). No school principal is an island: From individual to school sense-making processes in reform implementation. *Management in Education*, *33*(2), 77–85. https://doi.org/10.1177/0892020618805799

Ganon-Shilon, S., & Schechter, C. (2017a). Making sense of school leaders' sense-making. *Educational Management Administration & Leadership*, *45*(4), 682–698. https://doi.org/10.1177/1741143216628536

Ganon-Shilon, S., & Schechter, C. (2017b). Making sense while steering through the fog:

Principals' metaphors within a national reform implementation. *Education Policy Analysis Archives, 25,* 105. https://doi.org/10.14507/epaa.25.2942

Ganon-Shilon, S., & Schechter, C. (2019). School principals' sense-making of their leadership role during reform implementation. *International Journal of Leadership in Education, 22*(3), 279–300. https://doi-org.ezp.waldenulibrary.org/10.1080/13603124.2018.1450996

Ganon-Shilon, S., Tamir, E., & Schechter, C. (2020). Principals' sense-making of resource allocation within a national reform implementation. *Educational Management Administration & Leadership.*1–19.https://doi.org/10.1177/1741143220921191

Goddard, R., Skrla, L., & Salloum, S. (2017). The role of collective efficacy in closing student achievement gaps: A mixed methods study of school leadership for excellence and equity. *Journal of Education for Students Placed at Risk, 22,* 1–17. https://doi.org/10.1080/10824669.2017.1348900

Granovskiy, B. (2018). Science, technology, engineering, and mathematics (STEM) education: An overview. *Congressional Research Service, R45223,* 34.

Gravani, M. N. (2015). Adult learning in a distance education context: Theoretical and methodological challenges. *International Journal of Lifelong Education, 34*(2), 172–193. https://doi.org/10.1080/02601370.2014.982728

Guskey, T. R. (2002). Does it make a difference? Evaluating professional development. *Educational Leadership, 59*(6), 45–51.

Hargreaves, A., & Goodson, I. (2006). Educational change over time? The sustainability

and nonsustainability of three decades of secondary school change and continuity. *Educational Administration Quarterly, 42*, 3–41. https://doi.org/10.1177/0013161X05277975

Hargreaves, A., & M. T. O'Connor. (2018). *Leading collaborative professionalism*. California Corwin Press.

Harris, A. (2012). Leading system-wide improvement. *International Journal of Leadership in Education*, *15*(3), 395–401. https://doi.org/10.1080/13603124.2012.661879

Harris, A., & Jones, M. (2019). Leading professional learning with impact. *School Leadership & Management*, *39*(1), 1–4. https://doi.org/10.1080/13632434.2018.1530892

Holt, R., & Cornelissen, J. (2014). Sensemaking revisited. *Management Learning*, *45*(5), 525–539. https://doi.org/10.1177/1350507613486422

Honig, M. I. (2012). District central office leadership as teaching: How central office administrators support principals' development as instructional leaders. *Educational Administration Quarterly*, *48*(4), 733–774. https://doi.org/10.1177/0013161X12443258

Honig, M. I., & Rainey, L. R. (2015). How school districts can support deeper learning: The need for performance alignment. Executive Summary. Deeper Learning Research Series. In *Jobs For the Future*. Jobs for the future.

Honig, M. I., & Rainey, L. R. (2020). *Supervising principals for instructional leadership*. Harvard Education Press.

Honig, M. I., Venkateswaran, N., & McNeil, P. (2017). Research use as learning: The case of fundamental change in school district central offices. *American Educational Research Journal*, *54*(5), 938–971. https://doi.org/10.3102/0002831217712466

Honig, M. I., & Walsh, E. (2019). Learning to lead the learning of leaders: The evolution of the University of Washington's education doctorate. *Journal of Research on Leadership Education*, *14*(1), 51–73. https://doi.org/10.1177/1942775118819673

Johnson, P. E., & Chrispeels, J. H. (2010). Linking the central office and its schools for reform. *Educational Administration Quarterly*, *46*(5), 738–775. https://doi.org/10.1177/0013161X10377346

Keung, C. P. C., Yin, H., Tam, W. W. Y., Chai, C. S., & Ng, C. K. K. (2020). Kindergarten teachers' perceptions of whole-child development: The roles of leadership practices and professional learning communities. *Educational Management Administration & Leadership*, *48*(5), 875–892. https://doi.org/10.1177/1741143219864941

Killion, J., & Roy, P. (2009). *Becoming a learning school*. National Staff Development Council.

Kirsten, N. (2020). Persuasion and resistance. Large-scale collaborative professional development as a policy instrument. *Journal of Curriculum Studies*, *52*(3), 395–412. https://doi.org/10.1080/00220272.2019.1702721

Kretlow, A. G., & Bartholomew, C. C. (2010). Using coaching to improve the fidelity of evidence-based practices: A review of studies. *Teacher Education & Special*

Education, *33*(4), 279–299. https://doi.org/10.1177/0888406410371643

Lavigne, A. L., & Good, T. L. (2019). *Enhancing teacher education, development, and evaluation: Lessons learned from educational reform*. Taylor & Francis.

Lawson, H. A., Durand, F. T., Wilcox, K. C., Gregory, K. M., Schiller, K. S., & Zuckerman, S. J. (2017). The role of district and school leaders' trust and communications in the simultaneous implementation of innovative policies. *Journal of School Leadership*, *27*(1), 31–67. https://doi.org/10.1177/105268461702700102

Leithwood, K. (2013). Strong districts & their leadership. Toronto, Canada. A Paper Commissioned by The Council of Ontario Directors of Education and the Institute for Educational Leadership Toronto, Ontario: Ontario Institute of Education Leadership. https://professionallearning.education.gov.scot/media/1397/est-strong-districts-and-their-leadership.pdf

Leithwood, K., Harris, A., & Hopkins, D. (2020). Seven strong claims about successful school leadership revisited. *School Leadership & Management*, *40*(1), 5–22. https://doi.org/10.1080/13632434.2019.1596077

Lindvall, J., & Ryve, A. (2019). Coherence and the positioning of teachers in professional development programs. A systematic review. *Educational Research Review*, *27*, 140–154. https://doi.org/10.1016/j.edurev.2019.03.005

Lochmiller, C. R. (2018). Coaching principals for the complexity of school reform. *Journal of School Leadership*, *28*(2), 144–172. https://doi.org/10.1177/105268461802800201

Lowenhaupt, R., Spillane, J. P., & Hallett, T. (2016). Education policy in leadership practice: "Accountability talk" in schools. *Journal of School Leadership, 26*(5), 783–810. https://doi.org/10.1177/105268461602600503

Mackay, M. (2017). Identity formation: Professional development in practice strengthens a sense of self. *Studies in Higher Education, 42*(6), 1056–1070. https://doi.org/10.1080/03075079.2015.1076780

Mania-Singer, J. (2017). A systems theory approach to the district central office's role in school-level improvement. *Administrative Issues Journals, 7*(1). https://doi.org/10.5929/2017.7.1.6

Merriam, S. B. (2008). Adult learning theory for the twenty-first century: Part of a special issue entitled The third update on adult learning. *New Directions for Adult & Continuing Education, 119*, 93–98. https://doi.org/10.1002/ace.309

National Commission on Excellence in Education. (1983). A nation at risk: The imperative for educational reform. *The Elementary School Journal*, *82*(2), 113–130.

National Science and Technology Council. (2018). Charting a course for success: America's strategy for STEM education. https://www.whitehouse.gov/wp-content/uploads/2018/12/STEM-Education-Strategic-Plan-2018.pdf.

Noonan, J. (2019). An affinity for learning: Teacher identity and powerful professional development. *Journal of Teacher Education, 70*(5), 526–537. https://doi.org/10.1177/0022487118788838

Noonan, R. (2017). *Executive summary. STEM Jobs: 2017 Update.* U.S. Department of Commerce Economics and Statistics Administration, Office of the Chief

Economist. ESA issue brief *#02-17*, 16.

Oplatka, I. (2017). Principal workload: Components, determinants and coping strategies in an era of standardization and accountability. *Journal of Educational Administration*, *55*(5), 552–568. https://doi.org/10.1108/JEA-06-2016-0071

Peurach, D. J., Yurkofsky, M. M., & Sutherland, D. H. (2019). Organizing and managing for excellence and equity: The work and dilemmas of instructionally focused education systems. *Educational Policy*, *33*(6), 812–845. https://doi.org/10.1177/0895904819867267

Pietarinen, J., Pyhältö, K., & Soini, T. (2019). Shared sense-making in curriculum reform: orchestrating the local curriculum work. *Scandinavian Journal of Educational Research*, *63*(4), 491–505. https://doi.org/10.1080/00313831.2017.1402367

Prasad, P. (2018). *Crafting qualitative research: Working in the postpositivist traditions* (2nd ed.). Routledge.

Pyhältö, K., Pietarinen, J., & Soini, T. (2018). Dynamic and shared sense-making in large-scale curriculum reform in school districts. *Curriculum Journal*, *29*(2), 181–200. https://doi.org/10.1080/09585176.2018.1447306

Qian, H., & Walker, A. (2019). Reconciling top-down policy intent with internal accountability: The role of Chinese school principals. *Educational Assessment, Evaluation and Accountability*, *31*(4), 495–517. https://doi:10.1007/s11092-019-09309-4

Ravitch, S., & Carl, N. M. (2016). *Qualitative research: Bridging the conceptual,*

theoretical, and methodological. SAGE.

Reid, D. B. (2020). US principals' sensemaking of the future roles and responsibilities of school principals. *Educational Management Administration & Leadership.1-17.* https://doi.org/10.1177/1741143219896072

Rikkerink, M., Verbeeten, H., Simons, R., & Ritzen, H. (2016). A new model of educational innovation: Exploring the nexus of organizational learning, distributed leadership, and digital technologies. *Journal of Educational Change, 17*(2), 223–249.

Riveras-León, J. C., & Tomàs-Folch, M. (2020). The organizational culture of innovative schools: The role of the pincipal. *Journal of Educational Sciences / Revista de Stiintele Educatiei*, *41*(2), 21–37. https://doi.org/10.35923/JES.2020.2.02

Robinson, V., & Gray, E. (2019). What difference does school leadership make to student outcomes? *Journal of the Royal Society of New Zealand, 49*(2), 171–187. https://doi.org/10.1080/03036758.2019.1582075

Roessger, K. M. (2015). But does it work? Reflective activities, learning outcomes and instrumental learning in continuing professional development. *Journal of Education and Work, 28*(1), 83–105. https://doi.org/10.1080/13639080.2013.805186

Roy, P., & Killion, J. (2011). Guiding district implementation of common core state standards: Innovation configuration maps. In *Learning Forward (NJ)*. Learning Forward.

Rubin, H. J., & Rubin, I. S. (2012). *Qualitative interviewing: The art of hearing data* (3rd

ed.). SAGE.

Saldaña, J. (2016). *The coding manual for qualitative researchers* (3rd ed.). SAGE.

Schechter, C., & Shaked, H. (2017). Leaving fingerprints: Principals' considerations while implementing education reforms. *Journal of Educational Administration, 55*(3), 242–260. https://doi.org/10.1108/JEA-01-2016-0014

Shaked, H., & Schechter, C. (2016). Sources of systems thinking in school leadership. *Journal of School Leadership, 26*(3), 468–494. https://doi.org/10.1177/105268461602600304

Shaked, H., & Schechter, C. (2017). School principals as mediating agents in education reforms. *School Leadership & Management, 37*(1-2), 19–37. https://doi.org/10.1080/13632434.2016.1209182

Smith, E. C., Starratt, G. K., McCrink, C. L., & Whitford, H. (2020). Teacher evaluation feedback and instructional practice self-efficacy in secondary school teachers. *Educational Administration Quarterly, 56*(4), 671–701. https://doi.org/10.1177/0013161X19888568

Snyder, P., Hemmeter, M. L., McLean, M., Sandall, S., McLaughlin, T., & Algina, J. (2018). Effects of professional development on preschool teachers' use of embedded instruction practices. *Exceptional Children, 84*(2), 213–232. https://doi.org/10.1177/0014402917735512

Soini, T., Pietarinen, J., & Pyhältö, K. (2018). Shared sense-making strategies in curriculum reform: District-level perspective. *Improving Schools*, *21*(2), 111–126. https://doi.org/10.1177/1365480217744290

Spillane, J. P., & Anderson, L. (2014). The architecture of anticipation and novices' emerging understandings of the principal position: Occupational sense making at the intersection of individual, organization, and institution. *Teachers College Record*, *116* (7).

Spillane, J. P., & Kenney, A. W. (2012). School administration in a changing education sector: The US experience. *Journal of Educational Administration*, *50*(5), 541–561. https://doi.org/10.1108/09578231211249817

Stake, R. E. (1995). *The art of case study research*. SAGE.

Stigliani, I., & Elsbach, K. D. (2018). Identity co-formation in an emerging industry: Forging organizational distinctiveness and industry coherence through sensemaking and sensegiving. *Journal of Management Studies*, *55*(8), 1323–1355. https://doi.org/10.1111/joms.12403

Stosich, E. L., Bocala, C., & Forman, M. (2018). Building coherence for instructional improvement through professional development: A design-based implementation research study. *Educational Management Administration & Leadership*, *46*(5), 864–880. https://doi.org/10.1177/1741143217711193

Sullanmaa, J., Pyhältö, K., Pietarinen, J., & Soini, T. (2019). Curriculum coherence as perceived by district-level stakeholders in large-scale national curriculum reform in Finland. *Curriculum Journal*, *30*(3), 244–263. https://doi.org/10.1080/09585176.2019.1607512

Tamir, E., & Ganon-Shilon, S. (2021). A "cracking" school culture: Leading resource exploitation during implementation of a national reform. *Journal of Educational*

Administration. Advance online publication. https://doi.org/10.1108/JEA-09-2020-0198

Tamir, E., & Grabarski, M. K. (2020). Surviving the reform: Management usage of the garbage can model during implementation of reform. *Journal of Educational Administration*, *58*(3), 373–387. https://doi.org/10.1108/JEA-09-2019-0169

U.S. Department of Education. (2015). *Every Student Succeeds ACT (ESSA)*. https://www.ed.gov/essa?src%3Drn

U.S. Department of Education. (2020, October 13). Education innovation and research: Office of Elementary and Secondary Education, https://oese.ed.gov/offices/office-of-discretionary-grants-support-services/innovation-early-learning/education-innovation-and-research-eir/

Versland, T. M., Erickson, J. L., & Ng, D. F. S. (2017). Leading by example: A case study of the influence of principal self-efficacy on collective efficacy. *Cogent Education*, *4*(1). 1-17. https://doi.org/10.1080/2331186X.2017.1286765

Wang, F. (2020). Principals' self- and interpersonal leadership amid work intensification. *Journal of School Leadership*. 31(5):396-427. https://doi.org/10.1177/1052684620935383

Weick, K. E. (1995). *Sensemaking in organizations*. SAGE.

Weick, K. E., Sutcliffe, K. M., & Obstfeld, D. (2005). Organizing and the process of sensemaking. *Organization Science*, *16*(4), 409–421. https://doi.org/10.1287/orsc.1050.0133

Werts, A. B., & Brewer, C. A. (2015). Reframing the study of policy implementation:

Lived experience as politics. *Educational Policy*, *29*(1), 206–229. https://doi.org/10.1177/0895904814559247

White, K., Rotermund, S., & National Science Foundation. (2019). Elementary and Secondary Mathematics and Science Education. Science and Engineering Indicators 2020. NSB-2019-6. https://ncses.nsf.gov/pubs/ nsb20196/. Wise, D., & Cavazos, B. (2017). Leadership coaching for principals: A national study. *Mentoring & Tutoring: Partnership in Learning*, *25*(2), 223–245. https://doi.org/10.1080/13611267.2017.1327690

Yin, R. K. (2018). *Case study research and applications: Design and methods* (6th ed.). SAGE.

Appendix: The Project

Professional Learning Project: 3-Day Preservice and Follow-Up Quarterly Coaching Cycles

"Creating coherence around the STEM reform initiative"

Purpose

To increase the coherence around the system-wide STEM reform for improving student achievement by engaging in shared sensemaking process and practices and building a shared vision.

This Professional Learning Project and follow-up quarterly coaching cycles include processes for:

- reflecting on each stakeholder's moral purpose and connecting that moral purpose to the STEM initiative.
- understanding how to be a change leader.
- cultivating collaborative cultures through shared leadership practices and a culture of growth.
- establishing clarity of deep learning goals and precision in pedagogy; and
- developing conditions for maximizing internal accountability.

Program Outcomes

- To develop a focused direction and shared vision among district and site leadership, including site principals and teacher leaders.
- To develop a structure for systematically developing and cultivating collaborative cultures.

- To develop clarity regarding leading change and understanding that implementation is an iterative, nonlinear process grounded in learning by doing.

Target Audience

- District Central Office Leaders
- Elementary school principals
- Site Implementation Team Teachers

Format

- PowerPoint Presentation
- Engaging Activities
- Collaboration and Reflection
- Group dialogue and Presentations

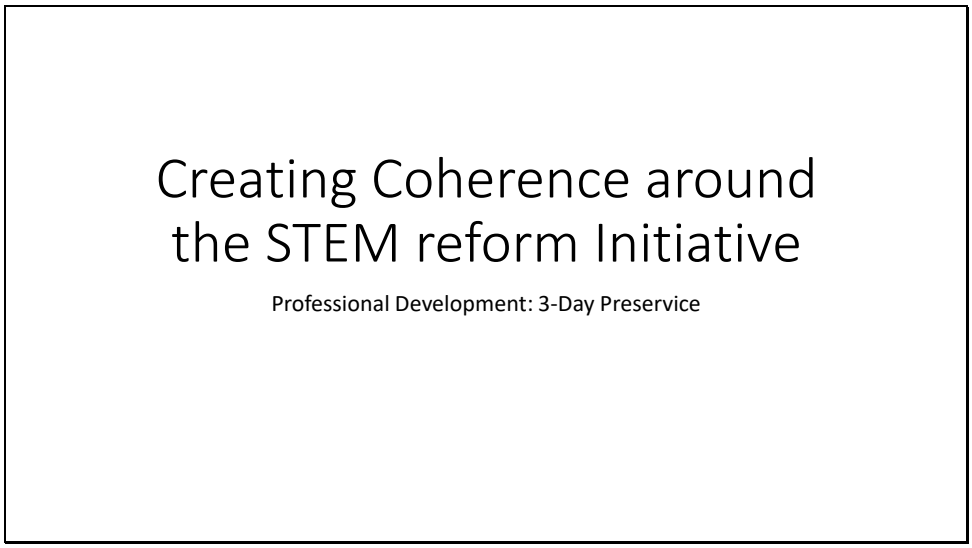
Timeline

The implementation will take place during the 2021-2022 school year.

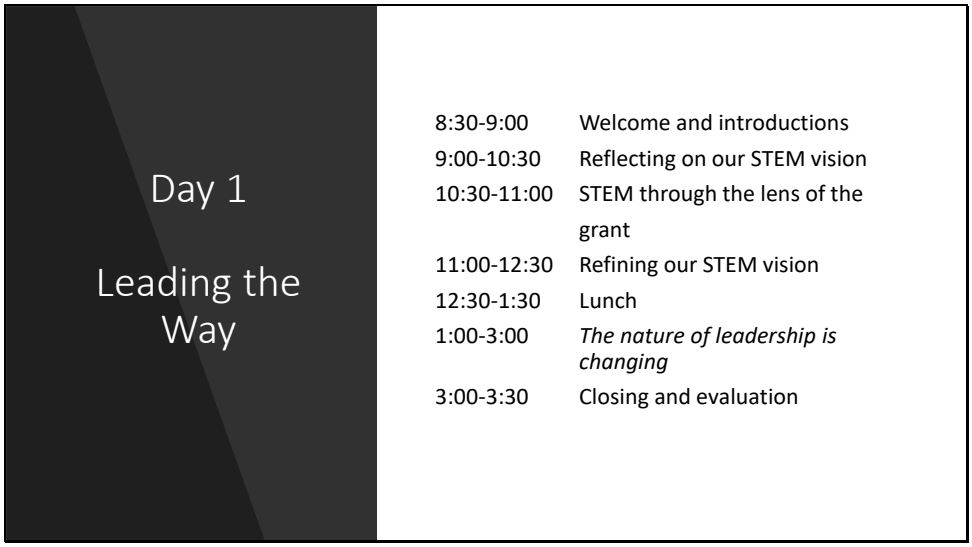
Materials and Equipment

- Computer
- Projection device
- Handouts
- Sign-in sheets
- Agenda
- Paper and pencil
- Poster paper

Slide 1



Slide 2



Slide 3

8:30-9:00
5 minutes Presenter introduces herself and the introduction activity and purpose.

The purpose of this activity is to engage participants in sharing their moral compass and to begin finding a shared why or core purpose.
It is important to note that a similar activator will be used in day two when teacher leaders join the training. The purpose is to give principals time to reflect on and be prepared for how they present their moral compass and leadership style.

10 minutes Activity 1: Introductions Activator. What is your why?
Attendees introduce themselves using the following strategy to create relational trust among participants in the room by sharing their "why"
At your table partner with the person to your left.
Introduce yourself by sharing: your name, site, how long you've been in education, and why you are an educator.
Be prepared to introduce your partner to the room in 20 seconds or less.

15 minutes Participants introduce their partner to the room.

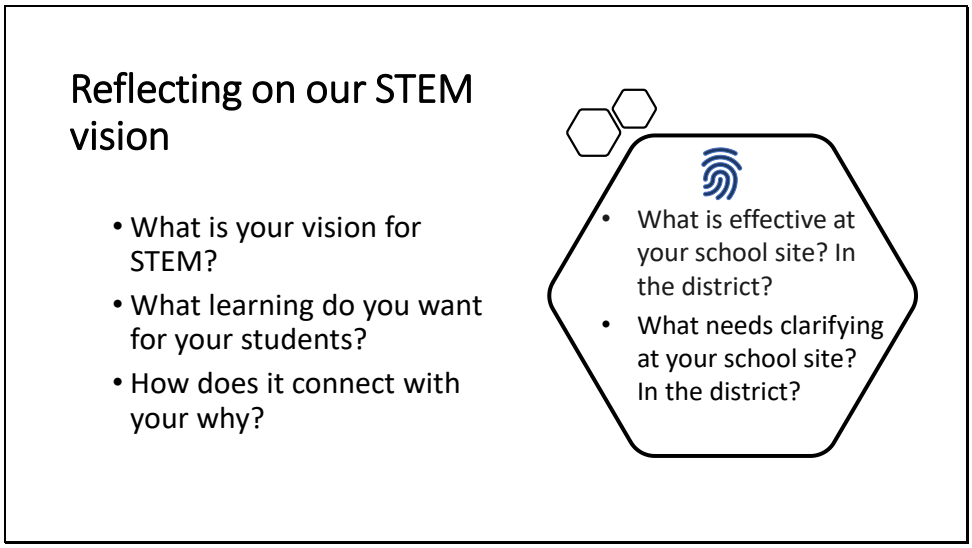
Slide 4

9:00-9:30
15 minutes Activity 2: Framing a collaborative approach. An activating strategy.

Presenter will start the discussion to engage prior knowledge and expand the individual and shared knowledge base toward leading as a change agent to improve student learning outcomes. Presenter should frame the session to focus on preparing to lead during day 2 and 3 of this preservice training.
Presenter shares quote and engages in a whole group discussion regarding what this means and how it applies to the STEM reform initiative. This should include presenter's moral purpose and drive for improving student learning outcomes.
The discussion should focus on implementation as an iterative process that requires everyone to fully engage in the process and articulate that this 3-day professional learning is the foundation for the leadership coaching cycles throughout the year.

15 minutes Activity 3: Reflecting

Slide 5

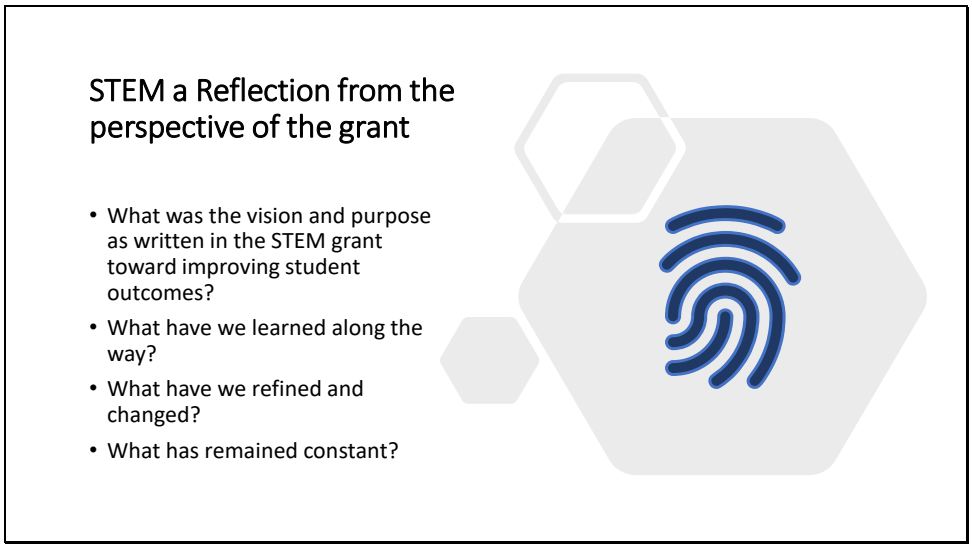


9:30-10:30
60 minutes Activity 3: Reflecting on STEM. A dialogue and discussion strategy.

Presenter articulates that this time is for participants to engage in self-reflection in preparation for sharing with their table groups and then the larger group. Again, it is essential to focus the group on our shared purpose: improving student outcomes.

- Participants engage in a written reflection process answering the questions listed in the slide.
- Participants share with their table using the strategy.
- After listening to their table, participants self-reflect, adding and refining their reflection.
- Participants reengage with their table and come to consensus regarding their collective vision for STEM, what is effective and what needs clarifying or change. They will create a poster to share with the room.

Slide 6



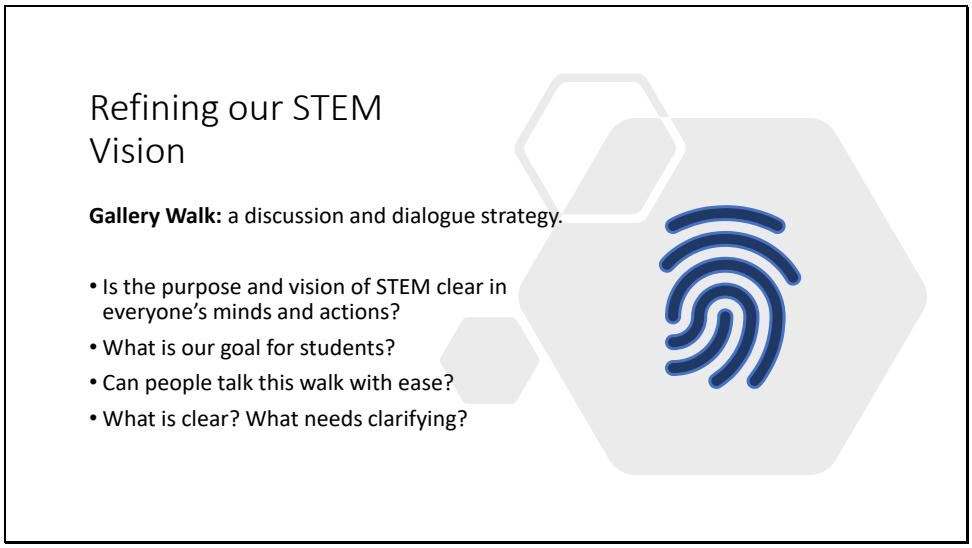
10:30-11:00
30 minutes Presentation

The District STEM project directors share their reflection of the STEM initiative from the perspective of the grant.

It is essential that the discussion is focused on their perspective as lead learners and that this discussion is one piece of the collaboration process for developing a clear strategy moving forward.

This discussion is intended to provide:
- current data tied to the outcomes of the initiative,
- highlight changes and refinements as a part of the refinement process, and
- an open door to engaging in deepening learning for all stakeholders.

Slide 7



11:00-12:30
45 minutes Activity 4: Gallery Walk. A discussion and dialogue strategy.

The purpose of this strategy is to allow central office and site leaders with the processing time for reflecting and discussing their vision for STEM before tomorrow's session with teacher leaders.

Presenter articulates that this process is intended to engage everyone in a transparent process for developing a collective vision for STEM. Part of the process of implementation is refining our vision and goals to bring clarity around what learning we want for our students. We are creating a shared mindset and refining our culture.

Gallery walk: Teams walk to each poster and reflect and discuss the questions above. Teams make note of their questions and comments, being prepared to share in the next activity.

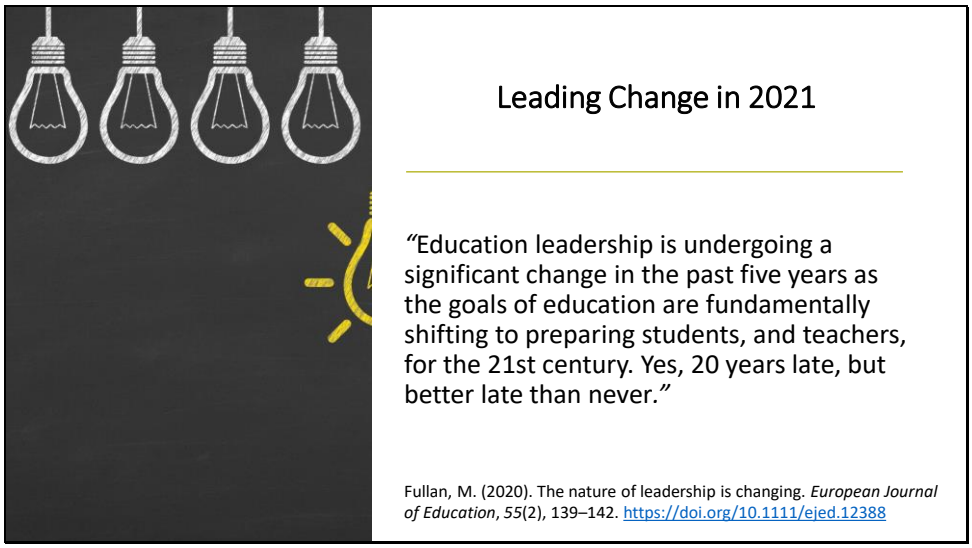
Questions for consideration during the gallery walk:
- Is the purpose and vision of STEM clear in everyone's minds and actions?
- Can people talk the walk with ease a specific?
- What is clear? What needs clarifying?

45 minutes Activity 4B: Gallery Walk Reflection

Whole group discussion: Presenter facilitates a whole group discussion to identify commonalities and differences in the STEM visions. Presenter should articulate that tomorrow's session will continue this process with teacher leaders in the room. Each school will participate in this process to refine their school vision for STEM and build a collective vision for STEM across the district.
The presenter should use this information to frame the next two day's training sessions.

Presenter should transition to the afternoon focus of being a lead change agent in 2021 and articulate the purpose of the afternoon is to discuss and develop a shared understanding of how to effectively lead change as a part of the STEM reform initiative.

Slide 8



1:30-1:40
10 minutes: Introduction to activity 5: Read and Example

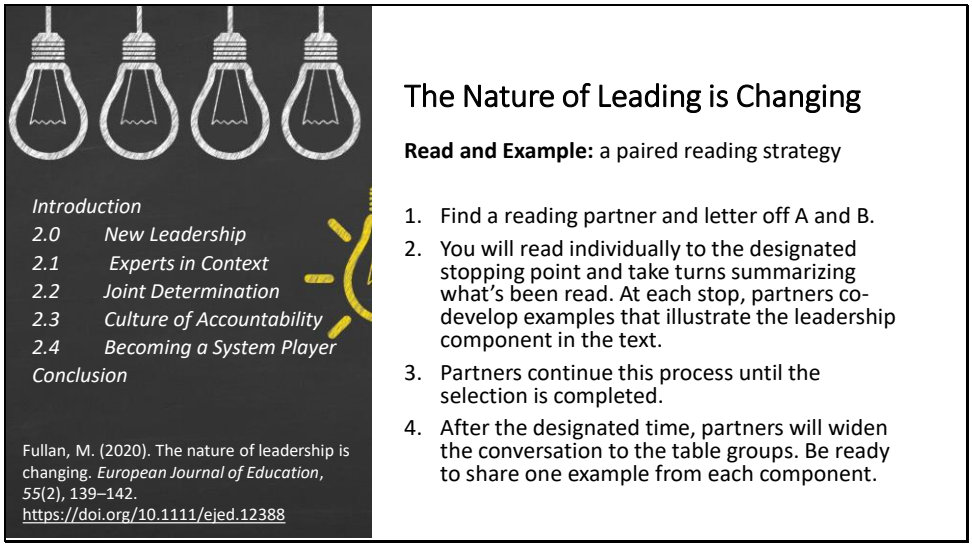
The purpose of this shared reading is to begin a discussion and develop a shared understanding of how to effectively lead change as a part of the STEM reform initiative and to articulate the purpose of the quarterly coaching cycles to support individual leadership needs.

Presenter will start the discussion to engage prior knowledge and expand the individual and shared knowledge base toward leading as a change agent.

Presenter shares quote and engages in a whole group discussion regarding what this means and how it applies to their role as a leader in the district implementing the STEM initiative.
The discussion should focus on implementation as an iterative process that requires everyone to fully engage in the change process.

Questions for discussion:
What are the implications for education?
For our district? For your school?
For you as a leader?

Slide 9



1:40-3:00
80 minutes: Activity 5: Read and Example: The Nature of Leadership is Changing

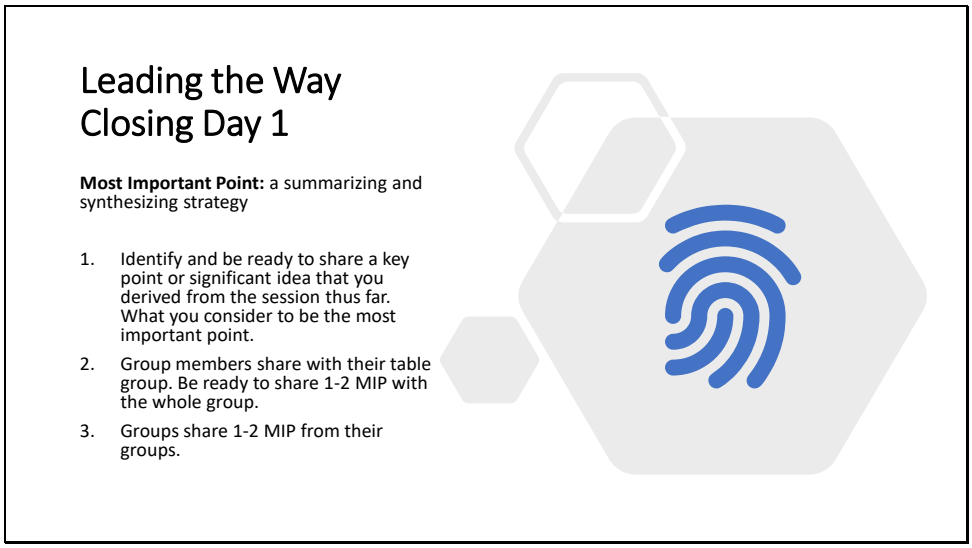
The purpose of this shared reading is to begin a discussion and develop a shared understanding of how to effectively lead change as a part of the STEM reform initiative. It is essential that the presenter articulate the district's commitment to a robust professional learning system that includes current practices (SIT leadership teams, Leadership Academy, professional learning department TOSAS) and will encompass new practices, which includes building innovation configuration maps to define expected outcomes, and leadership coaching cycles for principals.

- 5 minutes. Review the read and example strategy

- 35 minutes Partners follow the process.
- 20 minutes. Partners rejoin the table and share examples as a table
- 30 minutes. Whole group discussion. Presenter facilitates and charts examples of each component of leadership as it relates to the STEM initiative.

Strategy adapted from: Lipton, L., & Wellman, B. (2011). Leading groups: Effective strategies for building professional community. Sherman, CT: MiraVia.

Slide 10



3:00-3:30
20 minutes. Activity 6: Summarizing strategy: Most important point

Presenter closes the session by reflecting on the day's purpose and engaging participants in the activity.
Points to consider:

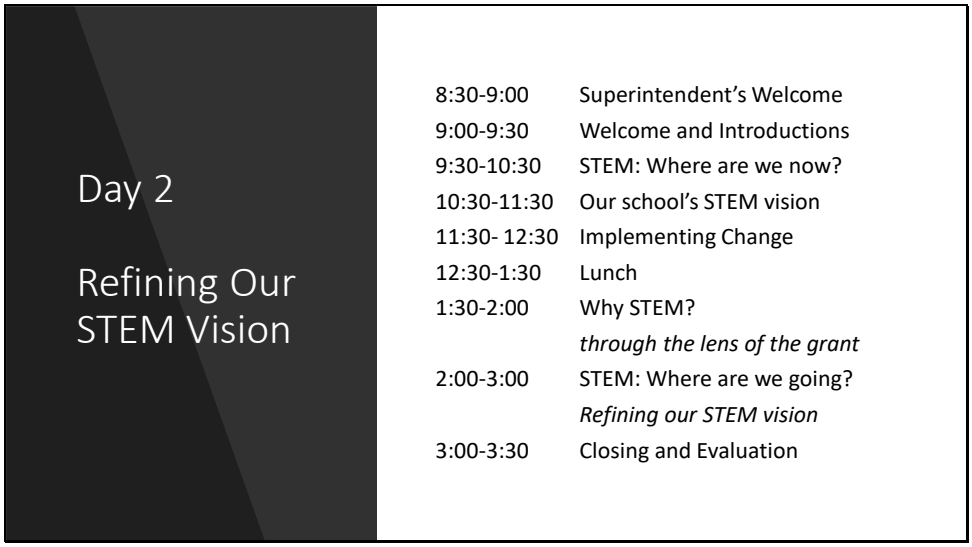
- What is your moral purpose?
- Why STEM four our students?
- How to be a lead change agent?

Presenter may also ask: What are the implications for tomorrow when our teacher leaders join us? How will you lead as a change agent tomorrow?

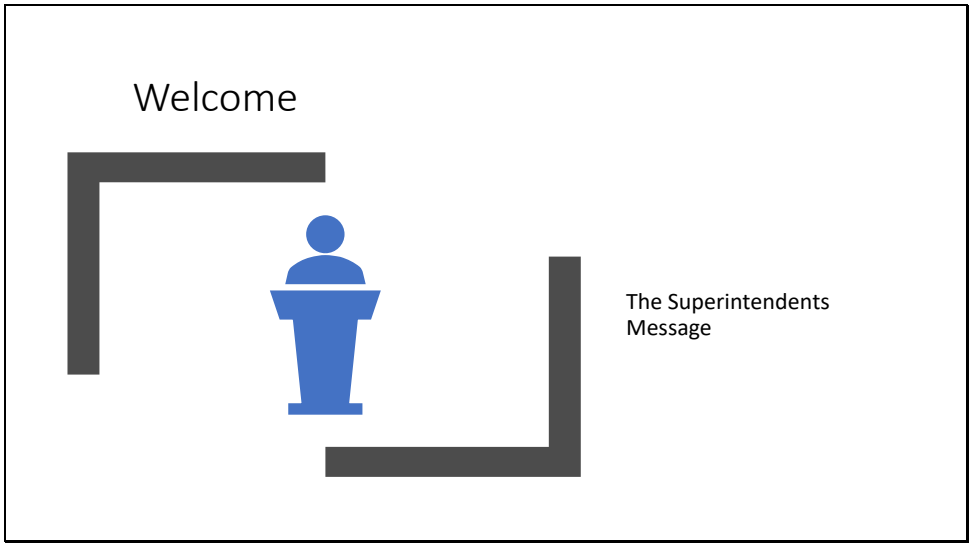
10 minutes: Participants will also complete the evaluation form for day one.

Strategy adapted from: Lipton, L., & Wellman, B. (2011). Leading groups: Effective strategies for building professional community. Sherman, CT: MiraVia.

Slide 11



Slide 12



8:30-9:00
30 minutes. Superintendent's welcome and message.

The superintendent traditionally gives a welcome speech with his yearly focus and vision during the fall preservice training.

Slide 13

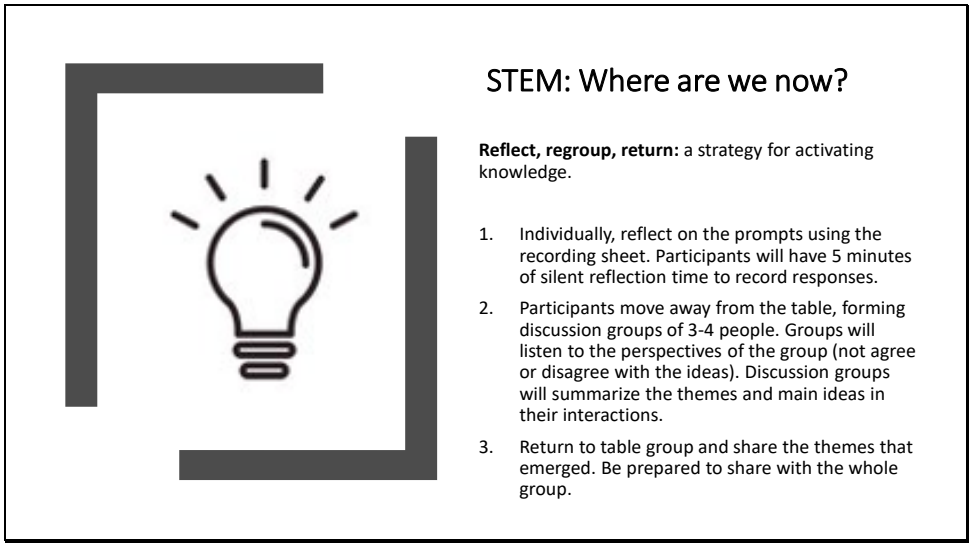
9:00-9:30
5 minutes Presenter introduces herself and the introduction activity and purpose.

The purpose of this activity is to engage participants in sharing their moral compass and to begin finding a shared why or core purpose. This is the time to lay the foundation to help participants find the shared connection that we are all here to improve student learning outcomes.

10 minutes Activity 1: Introductions Activator. What is your why?
Attendees introduce themselves using the following strategy to create relational trust among participants in the room by sharing their "why"
At your table partner with the person to your left.
Introduce yourself by sharing: your name, site, how long you've been in education, and why you are an educator.
Be prepared to introduce your partner to your table.

15 minutes Participants introduce their partner to the table.

Slide 14



9:30-10:30
60 minutes: Activity 2. Reflect, regroup, return: a strategy for activating knowledge.

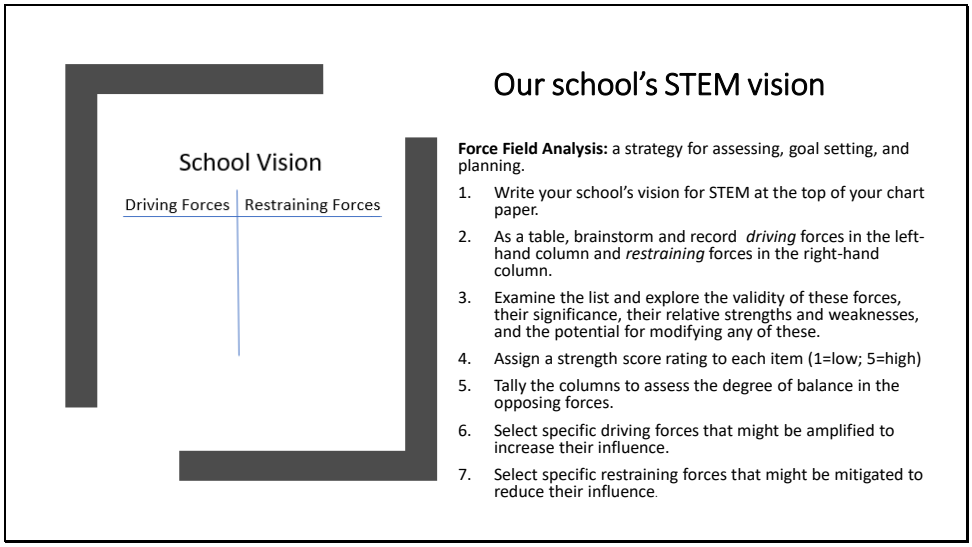
The purpose of this strategy is to establish balanced participation and provide a way for participants to generate thoughts and ideas, building the relational trust needed for the next two sessions.
The presenter should articulate the information shared in these workshops will be used to develop an innovation configuration map that will be brought back to the team for review before site teams use the tool to measure progress on the STEM initiative. should introduce the strategy and then share the prompts on a chart paper, leaving the directions on the PowerPoint visible. It is essential that the discussion from this session guide the rest of the session focus. When tables share their themes, the presenter should chart them. The presenter should use the responses to clarify thinking and refine the vision and expectations for STEM throughout the training.

Prompts:

- What is your vision for STEM? What learning do you want for your students? How does this connect with your why?

- What is effective at your school site? In the district?
- What needs clarifying at your school site? In the district?

Slide 15



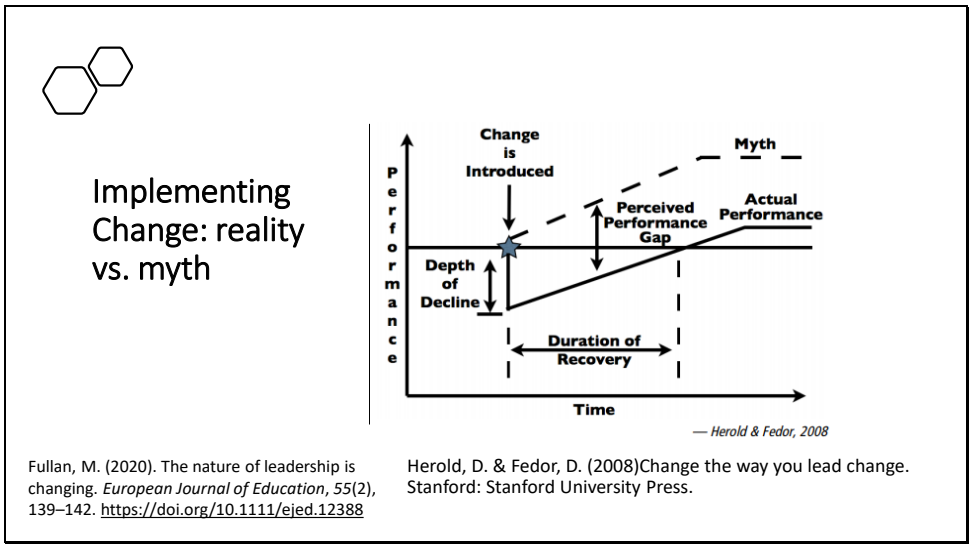
10:30-11:30
60 minutes: Activity 4. Force Filed Analysis: A strategy for assessing, goal setting and planning.

The purpose of this strategy is to refine each school's thinking around their STEM vision by using a visual tool for analyzing the forces that drive or impede the change process.

The presenter should introduce the strategy and then reiterate the purpose of this activity is to ultimately use the collective capacity in the room to address the complex problem of systemwide reform. "The solution to complex problems requires the intelligence and talents of everyone." Michael Fullan, 2016

Strategy adapted from: Lipton, L., & Wellman, B. (2011). Leading groups: Effective strategies for building professional community. Sherman, CT: MiraVia.

Slide 16



11:30-12:30
60 minutes. Implementing Change Presentation and Discussion. (includes next 3 slides)

The presenter should explain that that the session's focus on developing a collective STEM vision is going to be put on pause, to discuss the realities of implementing change (to improve student learning outcomes) and reiterate that the purpose of this preservice training is to increase the coherence around the system-wide reform for improving student achievement through STEM.

As a result of this workshop series, we, as stakeholders will:
- reflect on current implementation practices and processes
- develop and refine a focused direction and shared vision for STEM.
- systematically cultivate a collaborative culture.
- develop clarity around the learning goals and the process for developing precision in pedagogy for STEM.

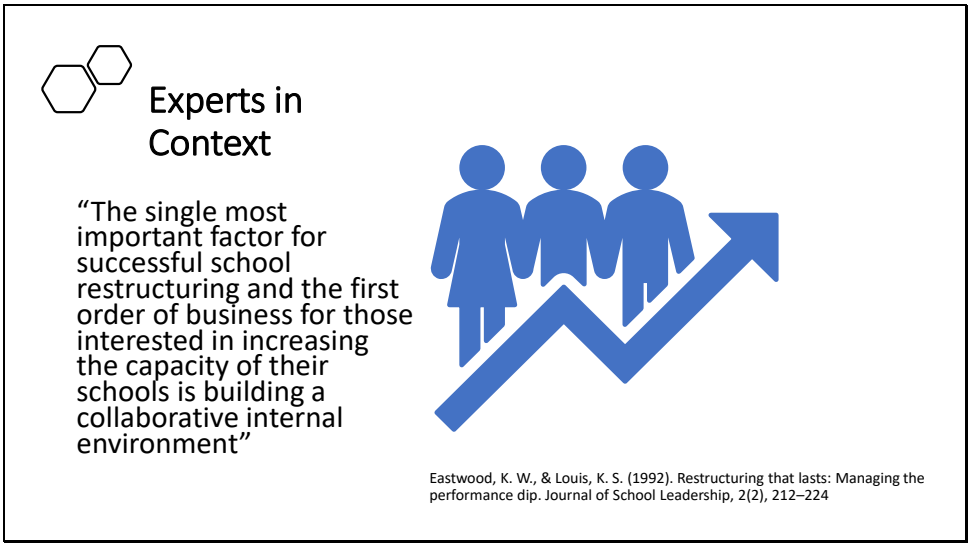
The discussion should address the challenge in wanting to have all of the answers, with clear direction, and outcomes at the start of any initiative, but the reality is that the change process for innovation occurs through a collaborative learning by doing approach. This discussion should mirror the reading from day 1: The Nature of Learning, by Michael Fullan.

Topics to address

- Experts in context. When we implement something new, we must participate as learners within our new context. This is true of each of us in our role as a leader, whether teacher leader, principal, or district leader. Connect to the graphic and make a connection to our moral purpose.
- Joint determination. Complex problems require complex solutions. “The solution to complex problems requires the intelligence and talents of everyone. Michael Fullan, 2016. Coherence. This means we must examine and reexamine our moral purpose in light of this new change.
- Culture of Accountability. “No amount of external accountability can be effective in the absence of internal accountability,” Richard Elmore, as quoted by Michael Fullan. Change is hard. To sustain change internal accountability is essential. Again, there should be a connection to the moral purpose. This refers to collaborative cultures that build our collective efficacy and our precision in pedagogy where we embrace continuous improvement.
- Becoming a system player. Each teacher, each school does not operate alone. We must recognize our role in being a part of the larger system.

These elements make us effective co-leaders and co-learners.

Slide 17



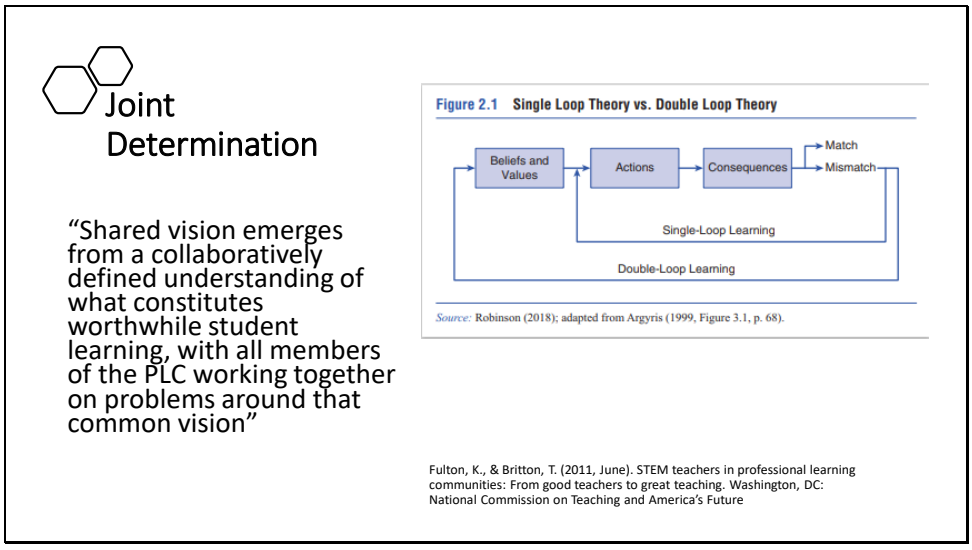
The presenter should explain that that the session’s focus on developing a collective STEM vision is going to be put on pause, to discuss the change process for innovation

and reiterate that the purpose of this preservice training is to increase the coherence around the system-wide reform for improving student achievement through STEM. The Presenter should again reiterate that this information will be used to develop an innovation configuration map.

The discussion should address the challenge in wanting to have all of the answers, with clear direction, and outcomes at the start of any initiative, but the reality is that the change process for innovation occurs through a learning by doing approach.

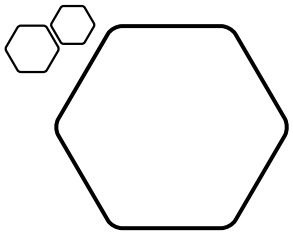
Eastwood, K. W., & Louis, K. S. (1992). Restructuring that lasts: Managing the performance dip. Journal of School Leadership, 2(2), 212–224

Slide 18



Slide 19

Culture of Accountability & Being a System Player



"Values must be driven into the policy, the decision-making, and ultimately the culture of the organization, otherwise value statements are just words. When values become part of an employee's DNA, they not only guide day-to-day work but also empower employees to act in unique situations"

Berry, L. L., & Seltman, K. D. (2008). Management lessons from Mayo Clinic: Inside one of the world's most admired service organizations. New York: McGraw-Hill.

Slide 20

STEM a Reflection from the perspective of the grant

- What was the vision and purpose as written in the STEM grant toward improving student outcomes?
- What have we learned along the way?
- What have we refined and changed?
- What has remained constant?

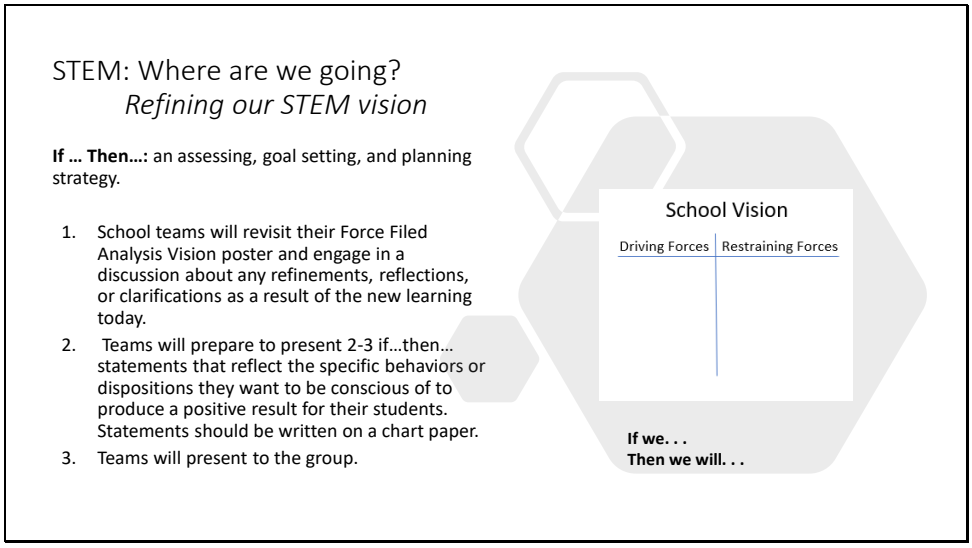
1:30-2:00
30 minutes Presentation

The District STEM project directors share their reflection of the STEM initiative from the perspective of the grant.

It is essential that the discussion is focused on their perspective as lead learners and that this discussion is one piece of the collaboration process for developing a jointly determined strategy (innovation configuration map) moving forward to improve student learning outcomes.

This discussion is intended to provide:
- current data tied to the outcomes of the initiative,
- highlight changes and refinements as a part of the refinement process, and
- an open door to engaging in deepening learning for all stakeholders.

Slide 21



2:00-3:15
45 minutes. Activity 5. If…Then... an assessing, goal setting, and planning strategy.

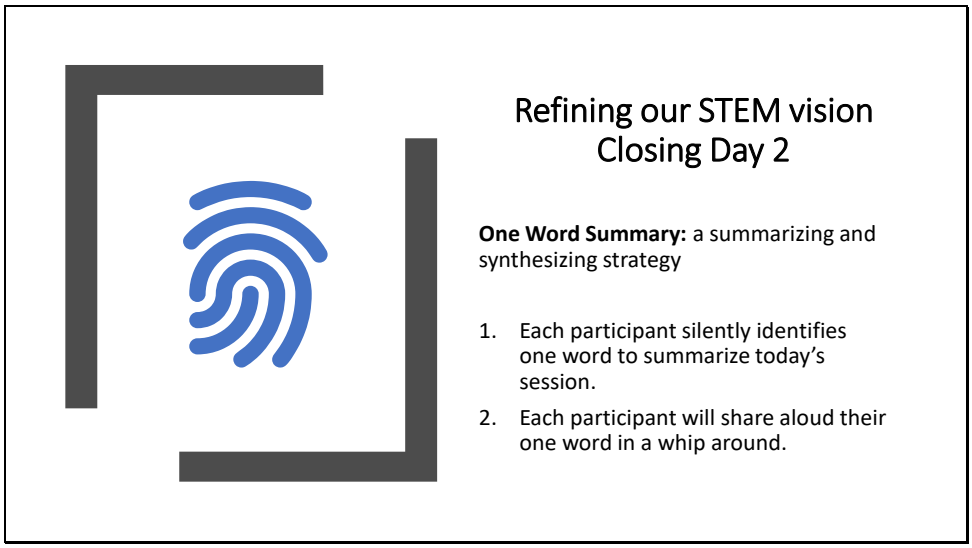
Presenter should connect the reflective activities from the day to developing a jointly-determined vision for STEM.
Presenter will ask teams to revisit their Activity 4. Force Field Analysis vision poster and allow teams time to reflect and refine their thinking based on the new learning about implementing change and the initial grant purpose.

Each school will present their vision and 2-3 if then statements.

The presenter should look for commonalities and topics that need clarifying for tomorrow's session and use this discussion to bring closure to the session. The presenter should articulate that this is an iterative process for refining our capacity to engage in this collaborative work and that the district is committed to building a collaborative culture and developing jointly-determined leadership practices.

Strategy adapted from: Lipton, L., & Wellman, B. (2011). Leading groups: Effective strategies for building professional community. Sherman, CT: MiraVia.

Slide 22



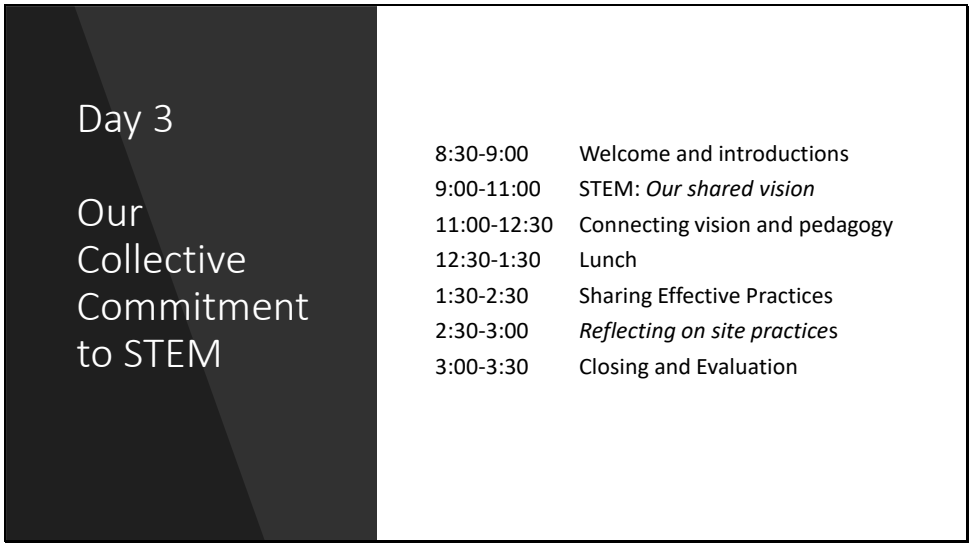
3:15-3:30
5 minutes. Activity 6: One word summary: a summarizing strategy.

Presenter closes the session by reflecting on the day's purpose and engaging participants in the activity.

10 minutes: Participants will also complete the evaluation form for day one.

Strategy adapted from: Lipton, L., & Wellman, B. (2011). Leading groups: Effective strategies for building professional community. Sherman, CT: MiraVia.

Slide 23



Slide 24

8:30-9:00
Presenter introduces the welcome activity and purpose.

The purpose of this activity is to engage participants in sharing their moral compass with the larger group on day 3 and to create a shared base of information for visioning STEM.

Activity 1: Give one, Get one: activating strategy.

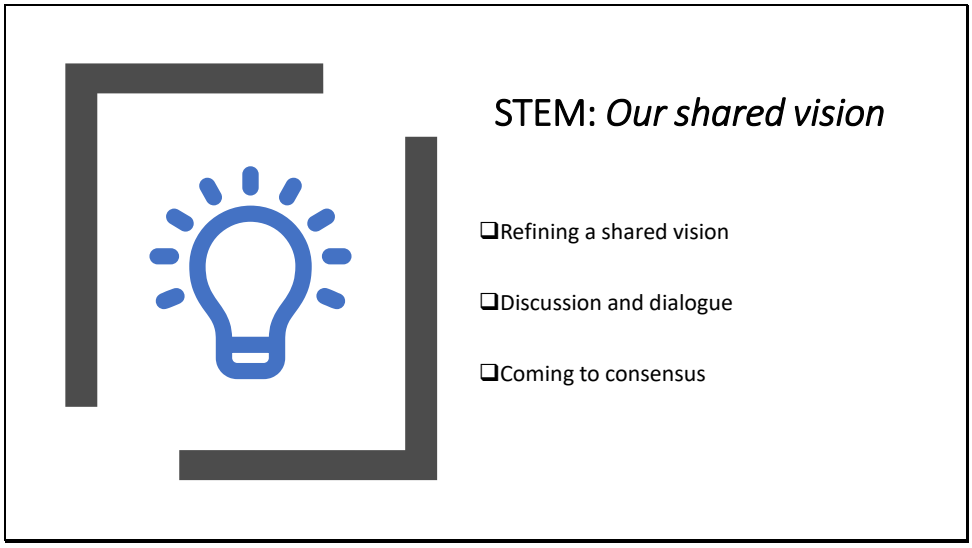
Presenter explains the process.

- Participants will complete the prompt on an index card.
- Participants will circulate the room, sharing the information on their card and then will exchange cards with their partner.
- Participants will continue to circulate the room, sharing the information on their card and exchanging their card with each new partner.

4. After 3-4 exchanges, the presenter will ask participants to go back to their table, card in hand and identify 1-2 themes to share aloud to the group.

It is essential the presenter connect these commonalities in the shared moral purpose as she transitions to activity 2: visioning.

Slide 25



9:00-11:00
20-30 minutes. Activity 2. Gallery Walk: a strategy for generating dialogue and discussion.
Vision commonalities in values and beliefs

The presenter should articulate the significance of this gallery walk as an opportunity to learn from each other, refine our thinking, and help us to narrow our goals and strategies for implementing STEM districtwide. It is essential that participants understand these posters reflect each school's unique understanding and that we will continue to refine and develop a shared vision over the next two days.

Teams conduct a gallery walk, revisiting each school's force field analysis vision poster. During the walk, teams identify commonly held, beliefs, values, ideas, and concepts among each school site.

45-60 minutes. Whole group discussion

Presenter facilitates the groups discussion charting the commonly held, beliefs, values, ideas, and concepts among each school site. Time should be allowed for individuals as well as tables to develop a draft of a vision statement (and may include values statements) and build consensus around the vision.
It is essential that all stakeholders in the room have a voice and that it is a collaborative process.

It is essential to tie this process into Robinson's double loop theory and articulate the importance of building in reflection to reconcile beliefs, actions, and consequences to bring coherence and address underling beliefs and assumptions over time.

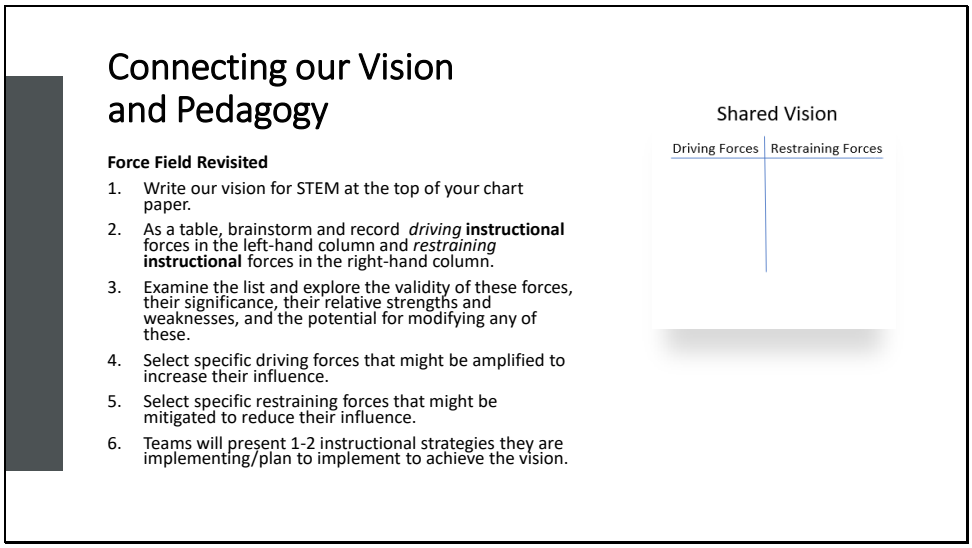
30 minutes. Building consensus

While it is important to note that the process may take longer than the allotted time, the presenter should be able to skillfully facilitate this process using the dialogue and discussion over the last two days. Should the group be ready to come to consensus, the presenter should conduct a fist to five consensus of the new vision.

Fist to five:
5: I fully support this vision and can articulate this vision to others.
4: I fully support this vision.
3: I can live with this vision.
2: I still have questions about this vision.

1: I cannot support this vision because there is a lot more to clarify.
0: I will actively work against this vision. I have a moral dilemma to this vision.

Slide 26



11:00-12:30
30 minutes. Activity 3. Force Field Revisited.

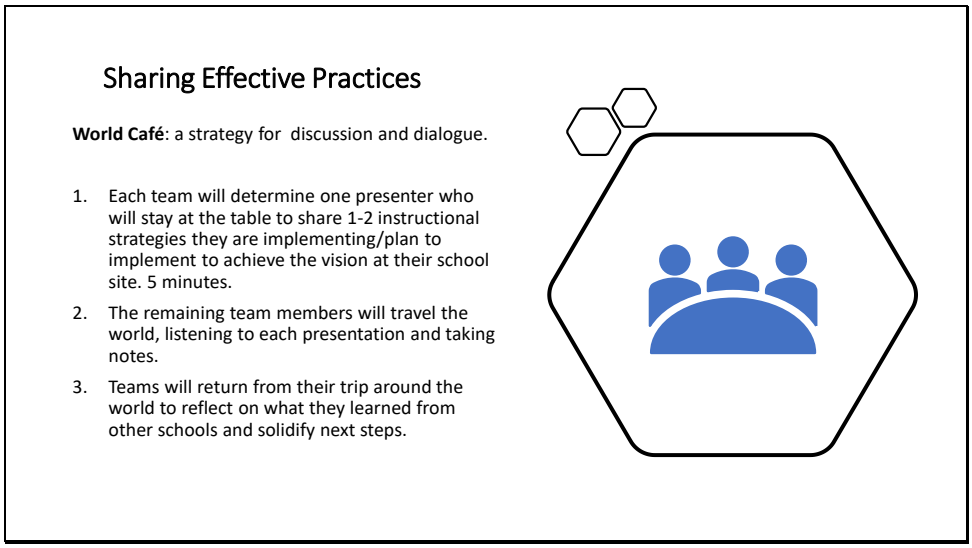
The purpose of this revision is to intentionally align to the shared vision and to narrow the focus toward effective pedagogy that impacts student learning. Again, this information will be sued to develop an innovation configuration map for implementing the STEM reform initiative.
Teams will also prepare to present 1-2 specific strategies to the whole group.

Once the shared vision is developed, school teams will need to revise and refine their vision force filed poster to reflect the realities of implementing the newly developed shared vision. The presenter should connect this to being a system player and recognizing the power in developing a jointly determined vision that will lay the foundation for true collaboration.

This time the presenter will narrow the focus of the driving and mitigating forces to instruction. The presenter should note that while there are many areas to address,

future session can and will address them. The biggest impact for improving student learning outcomes is to improve the teaching-learning process.
As the leaders, we are responsible for developing clarity around our learning goals through capacity building.

Slide 27

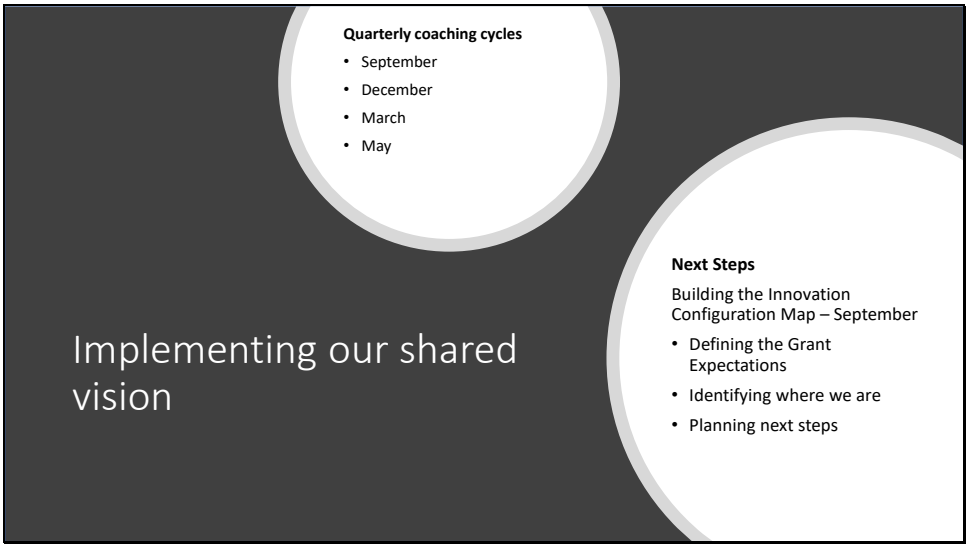


1:30-3:00
90 minutes. Activity 4: World Café: a strategy for discussion and dialogue.

The purpose of this activity is for teams to hold each other accountable for identifying and sharing effective pedagogical practices and for developing a collective commitment toward taking actionable steps to implement the shared STEM vision.

The presenter should revisit the preservice purpose and outcomes, connecting this collaborative activity to the process for developing actionable steps that focus on one shared vision.

Slide 28



2:45-3:00

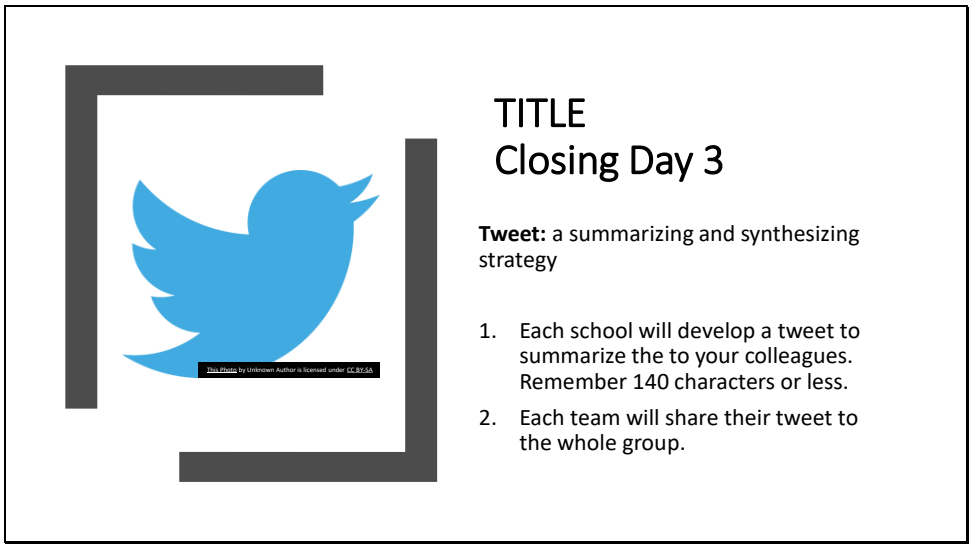
Next Steps

The presenter should reiterate that the past three days serve as the foundation to the system of support for the STEM reform initiative.
The discussion should focus on implementation as an iterative process that requires everyone to fully engage in the process, therefore quarterly leadership coaching cycles for principals are an additional component of the system for professional learning. The purpose is for district central office leaders and principals to engage in deep learning together to build coherence around the STEM reform initiative.

Based on the discussions and activities during this 3-day professional learning, the district STEM project directors will develop an innovation configuration map for the team to review and provide input. Principals and SIT members will then reflect on their level of implementation and set goals for the next quarter.

Additionally, the monthly site SIT meeting will serve as an opportunity for site principals and teacher leaders to analyze student data, reflect, share practices, and set goals to further implementation of the STEM reform initiative.

Slide 29



3:00-3:30
30 minutes. Activity 5. Tweet: a summarizing strategy.

Presenter closes the session by reflecting on the purpose of the 3-day preservice and asking school teams to prepare a tweet about the PD that they would share with their colleagues back at school.

10 minutes: Participants will also complete the evaluation form.

Strategy adapted from: Lipton, L., & Wellman, B. (2011). Leading groups: Effective strategies for building professional community. Sherman, CT: MiraVia.