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The Relationship Between Systems Thinking by Building Leaders and Academic Outcomes for Marginalized Students

Dunham Obadiah
Seattle Pacific University

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By

Obadiah Dunham

A dissertation submitted in partial fulfillment of the requirement for the degree of

Doctor of Education

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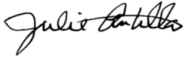
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Approved by

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Julie Antilla, Ph. D., Dissertation Committee Chair

_____

Munyi Shea, Ph. D., Committee Member

_____

Nyaradzo Mvududu, Ed. D., Committee Member

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Abstract

Despite the attempts by lawmakers to legislate a closing of the achievement gap, persistent gaps in performance for students based on ethnicity, race, economic level, disability, and first language persist throughout public schools in the United States. Occasionally, a principal will receive attention for raising the performance of minoritized groups in their school. However, while admired, the principal's efforts are not easily replicated. Furthermore, principal development programs fail to produce building leaders that can reliably achieve the change marginalized communities need.

There have been numerous studies that have shown that principals impact the academic performance of their students. For the last several decades, principals have been told to focus on instructional leadership, to be transformative leaders, and to distribute leadership responsibilities to teacher leaders. Yet, student performance has largely remained unchanged. Because of the lack of success and the evolution of schools' societal role, principals are being called to be systems thinkers.

In this mixed-method study, a review of the research related to systems thinking by school leaders is paired with an evaluation of student academic performance. The study is done on public schools along the I-5 corridor in western Washington. Building leaders were asked to evaluate their leadership on the Principal Systems Thinking Scale (PSTS). Their scores were then assessed against their students' performance on the Smarter Balanced Assessment (SBA) in English Language Arts and math. The PSTS survey also included open-ended questions where principals were asked to describe their leadership.

The study found inconclusive results on the impact of the level of a principal's self-reported systems thinking and the academic performance of their students. Additionally, results were inconclusive on the impact of systems thinking on closing the academic outcome gap. However, the study highlighted that principals have a limited understanding of systems thinking.

Keywords: systems thinking, PSTS, principal, outcome gap, marginalized students, academic performance, leadership

Chapter 1: Introduction

Despite the efforts of well-intentioned people at all levels of responsibility in public education, there exists a persistent gap in learning outcomes for students attributable to factors that have little to do with the ability to learn. From the highest levels of government to the individual classroom, there is a clear understanding that the opportunities afforded to students limit student performance, not innate ability (Noguera, 2008). Leadership constructs are desperately needed to center the efforts of educators on the work that matters the most for marginalized students.

Problem Statement

Legislative actions like No Child Left Behind and Race To The Top have done little more than spotlight the disparate outcomes produced by educational institutions (Sahlberg & Cobbold, 2021). Yet, schools and school staff continue to perpetuate a sorting system that results in the dominant culture receiving educational benefits that often need to be realized by traditionally minoritized students. To alleviate the weight of oppression, school leaders must develop a holistic approach to leading, considering the myriad factors that lead to school-based injustices. School leadership preparation typically involves self-nomination and enrollment in a principal preparation program. Selection to lead a school comes after they gain leadership experience through increasing leadership responsibility. In their first couple of years, school leaders are in pure survival mode as they learn the gravity of their new title. Veteran principals or district office personnel serve as mentors in districts that pay attention to principal preparation. Some principals emerge from this indoctrination as transformational leaders, others survive in the role long enough to reach retirement age, and others flame out after a couple of years

(Gordon, 2020). It is necessary to increase the intentionality of principal recruitment, development, and retention if there is any hope of radically redefining public schools.

Leadership constructs must be well-defined and grounded in practices intentionally focused on systems reform. Systems thinking offers promise in this area. Like schools are transitioning from a strict focus on the cognitive child to whole-child education, systems thinking broadens leadership beyond mere instruction to a holistic view of the schoolhouse. System thinking forces leaders to interrogate the paradigms driving their philosophy. It is a recognition that the leader's worldview determines the boundaries that limit their creativity (Jackson, 2006). A holistic approach to school leadership enhances the use of creative practices. Adopting a systems thinking approach enables managers to improve goal-seeking and viability, explore purpose, ensure fairness, and promote diversity (Jackson, 2006). Could a systems thinking framework for school leadership finally achieve just educational outcomes?

Purpose of Study

This investigation aims to identify the relationship between systems thinking by building leaders and narrowing outcome gaps for marginalized students. By analyzing systems thinking, the study intends to parse the relationship between a leader's ability to see the system as a whole and student academic achievement. The intent is to determine if holistic leadership approaches show more promise in promoting systemic reform than reductionist methods. Deep engagement with explicit equity methodology at the systems level may be foundational to healing the generations of ills done to minoritized students and their families by oppressive educational systems (Rigby et al., 2019). Knowing how systems thinking impacts student outcomes could impact principal development,

recruitment, and supervision. How common is systems thinking with current building leaders? Does systems leadership intersect with leadership for equitable outcomes? Can a holistic approach to school leadership create educational benefits for marginalized student populations?

Research Questions

This investigation will attempt to answer the following research questions:

Research Question 1: *Is there a difference in the student academic outcomes between schools led by building leaders with high systems thinking and schools led by building leaders with low systems thinking?*

Null Hypothesis: *There is no difference in the student academic outcomes between schools led by building leaders with high systems thinking and schools led by building leaders with low systems thinking.*

Research Hypothesis: *There is a statistically significant difference in the student academic outcomes between schools led by building leaders with high systems thinking and schools led by building leaders with low systems thinking.*

Research Question 2: *How prevalent is the use of systems thinking by building leaders?*

Research Question 3: *Is there a difference in outcome gap among marginalized students-in this study, referring to Black/African American students, Hispanic/Latino students, students qualifying for free and reduced lunch-between schools led by leaders with high systems thinking and schools led by building leaders with low systems thinking?*

Null Hypothesis: *There is no difference in the outcome gap among marginalized students-in this study, referring to Black/African American students, Hispanic/Latino students, students qualifying for free and reduced lunch-between schools led by building leaders with high systems thinking and schools led by building leaders with low systems thinking?*

Research Hypothesis: *There is a statistically significant difference in the outcome gap among marginalized students-in this study, referring to Black/African American students, Hispanic/Latino students, students qualifying for free and reduced lunch-between schools led by building leaders with high systems thinking and schools led by building leaders with low systems thinking?*

Assumptions and Expertise

The researcher has over twenty years of experience in the K-12 public school setting. That experience includes time in the classroom as a teacher, building leadership roles as an assistant principal and principal, and district leadership roles encompassing teaching and learning, special education, and school supervision. These experiences span two school districts of more than 20,000 students along the I-5 corridor in Western Washington. Furthermore, the researcher has a bachelor's degree in Biology, master's degrees in teaching and business administration, and certifications as a teacher, principal, and superintendent in the state of Washington. Through these experiences, the researcher has been able to observe a variety of practices related to school leadership. Observed leaders have had varying degrees of success in eliminating academic outcome gaps for marginalized students. Assumptions from these experiences include actions taken by

school leaders, strongly influencing student scholarly output, and the systems directly impacting student learning outcomes.

Significance of the Study

Systems thinking is a crucial management competency. Even more so in the twenty-first century as the global world becomes more interconnected (Shaked, Schechter, et al., 2019). While the systems of inequity typically lie outside of the school setting, the ability to promote equitable outcomes lies within the control of the educators in the school building (Noguera, 2008). Despite efforts by legislators and educators, gaps in education outcomes are pervasive in K-12 public schools. The benefits of systems thinking in many management areas suggest that in the hand of educators, it may help create just education outcomes. Yet, the existing research in systems thinking by school leaders is limited (Shaked, Schechter, et al., 2019). More empirical studies are needed to evaluate the relationship between systems thinking and academic performance. This study will serve to aid in those efforts.

Key Terminology

Academic outcome gaps: disparities in academic performance that correspond to race, class, home language, and neurodiversity that can be attributed to access to early childhood education, inequities in school funding, access to rigorous learning, and parental support (Noguera, 2012).

Distributive leadership: when responsibility for decision-making and organizational mission is shared across multiple roles in the school (Ishimaru & Galloway, 2014).

Equitable leadership: leadership that addresses the existing inequalities inherent in the education systems (Sahlberg & Cobbold, 2021).

Holistic leadership: focuses on how the parts work together in a network of interactions without breaking down the system to understand the features (Shaked & Schechter, 2018).

Instructional leadership: leadership that gives top billing to student learning and all other aspects of schooling is organized to promote academic outcomes (Shaked, Benolei, et al., 2019).

Strategic thinking: the ability of a leader to see the implications of their decisions on future outcomes for the organization.

Systems thinking: a holistic approach to leading complex organizations that considers the characteristics of the whole, the interconnectedness of the system's parts, and the organization's core mission (Arnold & Wade, 2015).

Organization of the Dissertation

The organization of the remaining four chapters of this investigation is as follows:

- Chapter 2 reviews the literature on systems thinking and academic outcome gaps.

- Chapter 3 explains the research methodology and procedures of the investigation.

- Chapter 4 analyzes and interprets the data gathered by the researcher.

- Chapter 5 consists of a summary, limitations, implications, recommendations for further study, and conclusion.

Chapter 2: Literature Review

Managing complex systems to balance children's needs with the adults' priorities generates a school model with a power imbalance. It can be nearly impossible for student outcomes or schools to change. Leadership may implement reforms, adopt new textbooks and curricula, restructure and reorganize schools, and replace principals. Still, unless there is a strategy for countering the normalization of failure, it is unlikely that anyone will reduce disparities in achievement or that schools will ever change (Noguera, 2008). The systemic change necessary to reorganize and restructure thinking requires a deep understanding of the systems causing the inequities. Research has shown that school members must collaborate, share insights, and strive for common goals to institutionalize and exploit current knowledge. These activities enable the development of an environment where school members are comfortable discussing their understandings of instructional approaches, conversations essential for knowledge exploitation, and school improvement (Benolei & Schechter, 2017). However, the isolating nature of the teaching profession, combined with the distaste for leadership training, leaves many school leadership teams needing a systematic approach to reform.

Schools, where members have a deep knowledge of system dynamics are schools where the principal and teachers firmly focus on improving students' experience. There is a clear focus on developing teaching and learning programs that identify and address the whole child's needs. These programs will then require constant monitoring by measuring the students' learning and appropriately adjusting teaching programs to enhance achievement (Ståhlkrantz & Rapp, 2020). Whether it involves recruiting staff or purchasing resources, every decision focuses on how these decisions can improve student

learning outcomes. Yet, in her research, Carol Ann Zulauf found a troubling theme. School leaders fail to understand the consequences of decisions. Many leaders cannot connect a decision with its possible consequences (Zulauf, 2007). With systems thinking in short supply in schools, it is challenging to see scenarios where courageous and visionary leadership will lead to fundamental systems changes for minoritized and marginalized student populations.

Interactions of students, staff, families, and communities create numerous intersecting layers that shape large organizations such as schools. Schools employ building principals to lead these complex organizations. Principals go to universities to learn the practical skills of running schools, such as managing a budget, creating a master schedule, and developing a bell schedule. Yet, when they enter school, they face complex problems caused by systems that promote inequitable outcomes and student access (Noguera, 2012). Many principals are ill-prepared to make the systemic changes desperately needed by the minoritized populations they serve. Is school reform an exercise in futility? Are principals doomed to a Sisyphean task? Can identifying and training principals in the principles of systems thinking be the pathway to educational justice?

Systems Thinking

An understanding of systems thinking allows for the exploration of this quandary. System thinking theory finds its roots in the Aristotelian worldview that the whole is more than the sum of its parts (Von Bertalanffy, 1972). Systems thinking found its way into the biological world as scientists began understanding the body system. A body made up of several interconnected components creates a lifeform. A body without a heart

cannot sustain life. A heart without a body is merely a mass of fleshy tissues. As people began to understand the interconnectedness of an individual, they applied systems thinking to the interactions between individuals (Von Bertalanffy, 1972). As with the human body, the sum of individuals' social interactions creates a society more remarkable than a single member. In their research, Arnold and Wade (2015) came to a definition of systems thinking that attempts to capture the elements, interconnections, and purpose of systems thinking. They defined systems thinking as "a set of synergistic analytic skills used to improve the capability of identifying and understanding systems, predicting their behaviors, and devising modifications to them to produce desired effects" (Arnold & Wade, 2015). Arnold and Wade's definition is more complicated than earlier definitions of systems thinking, focused on seeing the whole before the parts (Shaked & Schechter, 2020). Their description begins to help leaders recognize the constructivist approach to systems thinking.

The term "thinking" in systems thinking implies that the system must be involved in social learning. Social learning comprises constructing meaning through interactions with others and the surrounding environment. This type of learning finds its foundation in social constructivism learning theory. According to social constructivists, interactions with others and the world lead to significance building. Learning happens when interpreting the exchanges yields an active meaning construction (Koral Kordova et al., 2018). Juxtaposed to constructivist learning is reductionist learning. Reductionist theory traces back to Presocratic philosophers. All things made of the same rudimentary elements are the essence of the reductionist philosophy. The leader must break one of its parts down to its fundamental features to understand the system.

Reductionists expect each part of the system to behave similarly (Nagel, 1998). Understanding a portion and its elements leads to understanding the system as a whole. Systems thinking requires studying the whole by anchoring its roots in constructivism (Jackson, 2006). Considering the whole instead of the parts departs from reductionism and a pivot to constructivism. System thinkers link learning theory and practical application by attending to structure and process. School systems comprise students, staff, families, community, district or local education authority, and state or national policy. Systems thinkers consider how all three levels influence each other and utilize this context to inform their decisions (Shaked & Schechter, 2020). Improving the focus and achievement of the core mission in a high-functioning organization requires synergistic analytical skills. Leaders identify and understand systems, predict their behaviors, and devise modifications to produce the desired effects (Arnold & Wade, 2017). Systems thinking requires leaders to identify the systems, understand the methods, predict the system's behavior, and modify the system to achieve the desired effect (Norqvist & Ärlestig, 2021).

Unfortunately, school leadership tends to isolate leaders at all levels. School members refer to central leadership as "The District," while classroom-based staff refers to building leaders as "The Administration." The conventional leadership structures give amorphous lifeforms to individuals with formal titles separate from their personal identities. Furthermore, school leaders begin to define themselves based on their school as if it is an island in and of itself (Norqvist & Ärlestig, 2021). On the other hand, systems thinkers take a broader and more complete view of the system's components and environment. They direct their efforts accordingly. System thinkers expand their

perspectives beyond the boundaries of their schools. They can envision the whole scenario, including the coexistence of the internal and external school communities (Shaked & Schechter, 2020). They can understand the system conceptually and functionally without understanding its minutiae (Shaked & Schechter, 2020). School leaders that serve as systems thinkers apply systems thinking in their schools by first evaluating elements of school life according to their significance to the entire community. Second, they are open to various opinions from a myriad of stakeholders (students, families, staff, and community members). The systems leader leads from a position of humility with self-awareness of their limitations and readiness to learn from others. Third, leading wholes refers to the principal's holistic perspective, oriented toward seeing the big picture and not only its individual parts. Fourth, adopting a multidimensional view refers to the principal examining several aspects of a given issue simultaneously by attributing that issue's emergence and existence to a wide range of potential sources (Benolei et al., 2019). Principals are called upon to be systems thinkers in today's educational environment.

Intersections with Popular Leadership Paradigms

The art of leadership requires the appointed leader to recognize and utilize the informal powers within their school. The job's scope has moved past the seemingly passé role of a building manager and is more complex than instructional leadership. The traditional definition of instructional leadership defines the building leader's essential responsibility to focus on curriculum and instruction (Horng & Loeb, 2010). Operationalizing this definition has caused district leaders to recruit and hire master teachers for leadership roles. Instructional leaders give top billing to the academic

learning of their students, with everything else relegated to the margins. Instructional leadership is related to systems thinking in that it calls upon principals to focus on the organization's primary goal (Shaked, Benolei, et al., 2019). Yet, the job of today's principal has become more complicated. Principals are facing the challenges of leading schools in the 21st century. They must develop a holistic perspective of systems thinking. Leadership development must emphasize understanding the system instead of isolating and managing each part.

Distributed Leadership

In many schools, a single person no longer claims the mantle of the leader. School systems have language codified in their collective bargaining agreements that distribute the formal leadership responsibility to other educators in the building. Leadership is a dyadic, shared, relational, and complex social dynamic (Benolei et al., 2021). In the schoolhouse, select teachers serve as middle-level management. Often, these leaders are democratically elected to their roles by their peers without regard to formal leadership training. Because of the distribution of leadership, teacher leaders significantly influence the quality of teaching and learning (Shaked & Schechter, 2017). Distributed leadership poses a theoretical departure for schools and districts from top-down management. However, the promises of more minds sharing decision-making responsibility often result in mistrust of external initiatives and fatigue related to school improvement. Often leadership learning among teachers and principals is too shallow to exact systemic change (Norqvist & Ärlestig, 2021). The level of educational injustice in many schools continues to prevail.

Producing different experiences for minoritized students and their families requires reimagining school systems. School leadership must address the social conditions that create and give meaning to these disparities, for they, too, can have a powerful effect on beliefs and behavior. Therefore, to produce academic outcomes demonstrating that race is irrelevant to academic achievement, schools must address how racial identity and stereotypes are reinforced and reproduced within educational settings (Noguera, 2012). Researching leadership practices addressing systems-level inequity and defining equity in systemic terms is vital. Principals serve as the executive liaison between the school and complex central offices. Examining the leadership practices of this role is an excellent start to seeing equitable leadership at the systems level (Rigby et al., 2019). While untrained distributed leadership can help solve technical problems of operation, a deeper understanding of systems is required to create the transformational changes schools need.

Stages of Systems Thinking

According to the research done by Arnold and Wade (2015), systems thinking has eight distinct elements:

1. Seeing the critical connections between parts of the system.

2. Identifying feedback loops and how they impact the behavior of the system.

3. Understanding the structure of the system and how they facilitate system behavior.

4. Differentiating between various systems variables and how they operate.

5. Identifying and understanding non-linear relations in the system.

6. Recognizing the dynamic nature of the system.

7. Modeling the different parts of the system to view the system in different ways.

8. Acknowledging the different scales of systems and the systems within larger systems.

The interconnection of these elements (see Figure 1) emerges in the leader's ability to perform effective systems thinking.

Figure 1

Systems Thinking Systemigram (Arnold & Wade, 2015)
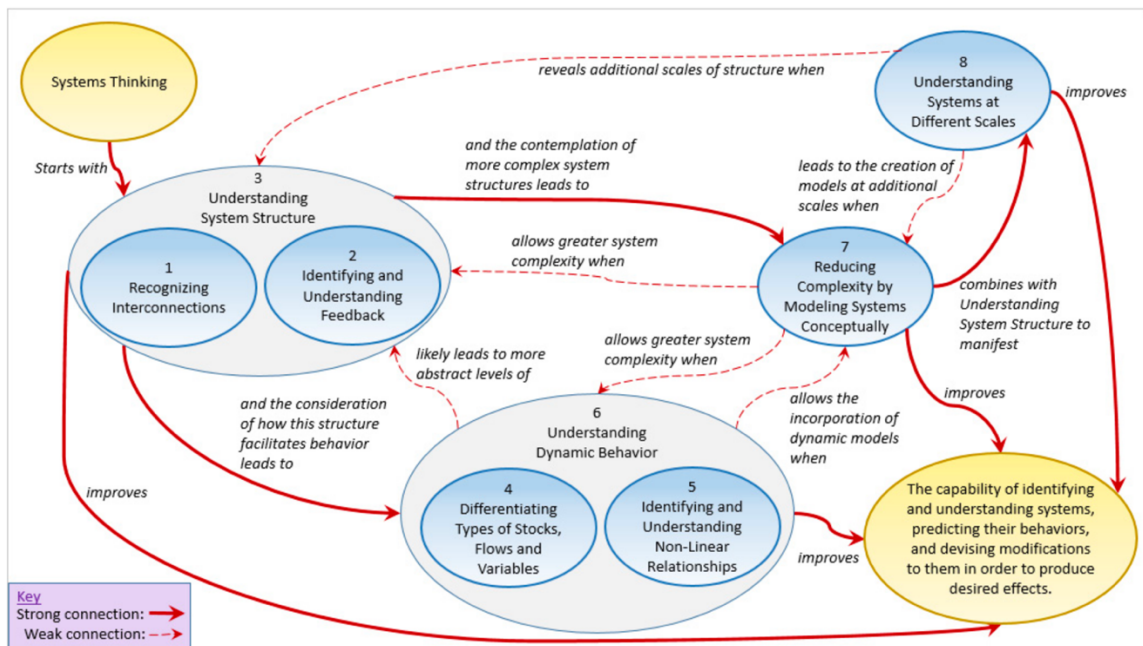
Instructors can explicitly teach systems thinking in the classroom setting. Learners must intuitively recognize the interactions, feedback, and causality between the system's parts. Through intentional instruction, learners develop high-level cognitive processes and pattern recognition inherent in the system (Clark et al., 2017). People with robust systems thinking skills can see the big picture while using their analytical strategies to conceptualize and reason with new information (Thibodeau et al., 2016), a

specific set of methodologies in learning systems thinking. The starting point is developing self-awareness. The learner becomes increasingly cognizant of how their actions, beliefs, decisions, and behaviors impact others. In doing so, they begin to see the subtle signals in the system that indicate its interlinking frame. Studying the nature of the system becomes a team event instead of a solo pursuit. There becomes a collective reliance on the use of inquiry to explore the dynamics of the systems. Teams can view any problem or situation through a wide lens with transparent and authentic group inquiry and questioning (Zulauf, 2007). Recognizing the learned versus innate nature of systems thinking allows mentors and supervisors to have a growth mindset as they approach leadership development.

As an individual metamorphosizes into a systems thinker, predictable stages and patterns of leadership begin to emerge. A review of the research by Shaked and Schechter (2018) indicates that developing systems thinking in school leaders occurs over five stages. The preservice stage occurs as aspiring building leaders work closely with their mentor principal during the internship. An expansion of view typifies this stage. Aspiring leaders develop an awareness of what happens beyond the four walls of their classroom. They enter the survival stage when they transition to formalized leadership roles, such as being a building leader. Principals faced with the day-to-day reality of leading an organization appear to experience an actual slowdown in the development of systems thinking. An inundation of new information causes a significant narrowing of focus. When the routine operations of the school become predictable for the principal, their view once again broadens, and they enter the consolidation stage. Consolidation typically

occurs between years three to five and is marked by a gradual development of systems thinking. As principals transition into master principals, they enter the maturity stage.

Principals at this stage begin to develop a systemic view of school leadership. They form the ability to see how their school intersects with the larger community. They recognize that their decisions influence their district, colleagues, and community members. Interestingly, some principals began to become disenfranchised with their work or role. Disenfranchisement leads to the decline stage, where there is a regression in thinking systemically (Shaked & Schechter, 2018). As principals progress through the phases of systems thinking, Benolei et al. (2019) report an increase in positive student outcomes and teachers' overall satisfaction.

As principals advance from the consolidation stage to the maturity stage, a subtle but distinct set of characteristics emerges. No longer encumbered by each of its parts, they began to be able to see the big picture. In other words, principals start to see the interconnections between budget management, student performance, teacher evaluations, district initiatives, community interests, and other parts of the system. They began to lead with this broader perspective with the whole system in mind. Systems thinkers see themselves as embedded within the system, not as having a relationship with it. They began to develop interdependence with the sociocultural system (Thibodeau et al., 2016). As principals become systems thinkers, they begin to indirectly influence the goals and mission of the school by attending to the various school elements. They see each element as a series of toggle switches connected to the organization. They manipulate each lever with a keen awareness of its reciprocal influences on the other aspects of the school. They use a multidimensional view to consider the organization's issues. They become adept at

evaluating the significance of each element of school life as a whole (Shaked &

Schechter, 2020). Through this more nuanced understanding, principals view the system

as the sum of interconnected parts. As this shift occurs, principals start to think about the

whole system through three overarching themes. First, they consider how the system's

architecture influences the behavior of its members. Second, they shift from an

orientation towards blaming the system to seeing how they contribute to the system's

state. Finally, they develop a metacognitive approach to the system where they spend

time thinking about systems thinking (Zulauf, 2007). As the leader advances through the

stages of systems thinking, the school begins to function as an integrated system.

Schools as Open Systems

Schools are living systems exchanging matter and information with their

environment. The dynamic systems theory outlined by Von Bertalanffy finds its roots in

the open systems of biology and ecology (Von Bertalanffy, 1972). Open systems are

susceptible to external environmental factors interrupting workflow, direction, and

purpose. In such organizations, leaders can neither guarantee outcomes nor trace results

to a particular set of conditions (Shaked, Schechter, et al., 2019). Systems such as schools

function as open systems in that understanding how they function requires attention to

their ambiguous and nebulous nature. Schools and districts rely on exchanging

information and resources with their surrounding environment (Shaked, Schechter, et al.,

2019). These exchanges of information allow them to maintain homeostasis. From a

systems perspective, homeostasis describes a system's ability to maintain balance in the

face of competing forces or influences (Shaked, Schechter, et al., 2019). Through

feedback loops, systems can achieve balance through self-regulating external demands,

environmental factors, and the internal state. This process leads to a state of negative

entropy. Negative entropy recognizes the system's ability to increase order and stability

over time, given sufficient environmental inputs (Shaked, Schechter, et al., 2019).

Schools functioning as open systems thrive through their' dynamic relationship with the

community they serve.

Systems Dynamics

The implications of systems dynamics for school leadership provide a framework

that allows school principals to see beyond the surface, revealing deeper patterns of

relationships among the feedback loops responsible for creating behaviors (Shaked &

Schechter, 2020). The balance between the internal and external school communities

becomes the daily dance of the systems thinker principal. Principals may attempt to

maintain a tight boundary around the school, creating an environment that strengthens the

feeling of school staff belonging, protecting the school core from information overload,

and enhancing the exploitation of knowledge. On the other hand, by keeping a loose

boundary around the school, principals may contribute to adjustment and innovation,

promoting the exploration process by increasing awareness of new developments in the

school environment (Benolei & Schechter, 2017). The organization's health lies in the

principal's ability to balance the interior and exterior school communities.

A principal engaged in systems thinking must attend to the internal activities

typically attributed to the building leader's role and the external actions necessary for

achieving audacious goals. Early educational management theories proposed that

principals should focus primarily on the internal school instruction processes (e.g.,

quality of teaching, student achievement, instructional improvement plans, teacher

support, and internal communication). Principals shielded staff and students from anything occurring outside the school boundary (Benolei & Schechter, 2017). However, understandings about the critical nature of the external activities related to school life have begun to evolve. External events include behaviors aimed at representing the school to external constituents, gaining access to resources and external support, and scanning the environment for information and knowledge necessary for meeting school goals. Principals must actively establish a relationship between the school members and external stakeholders, such as learning about community power structures, maintaining appropriate relationships with parents, and generally providing a bridge between the external environment and the school (Benolei & Schechter, 2017). Using systems thinking allows the building leader to take a holistic approach to the school in their charge. Systems thinking becomes a type of orientation toward the world, a model for thinking and learning about the system (Shaked & Schechter, 2018). Leaders who manage the school's dynamic internal and external activities deftly create school cultures centered on student success and happiness.

The most frequently used definition for school leadership outlines three dimensions defining the school's mission, managing, monitoring, and developing the school's instructional program, and creating a positive school learning climate. Benolei et al. (2019) found that building leaders pay particular attention to the core mission of schooling by coordinating the school's academic program. Yet, when a principal leads with such a narrow focus, they miss many parts of the system. To address seemingly competing policies, conflicting objectives, and partisan demands, principals must develop a capacity for "bilingualism" in that they can speak both "managerial/marketing" and

"professional/education" languages (Benolei & Schechter, 2017). Principals must manage the tension created by internal pressures and the demands within the school's boundaries. Principals must facilitate knowledge transfer within and across the school boundary to promote continuous collaborative learning (Benolei & Schechter, 2017). To achieve this, school leaders should measure classroom observations, student participation, software and device downtime, teacher professional development effectiveness, parent engagement, preparation time, and school climate. These data points are all leading indicators of student success, yet they are rarely measured (Rice, 2017). The focus narrows to standardized test scores as academic accountability measures, causing education leaders to become more proficient in reviewing data. As Rice (2017) points out, a systems thinker must take a broader view of data. A systems thinker is data-wise when taking a holistic approach to organizational performance evaluations. A systems thinker must look at a problem from multiple perspectives and levels. Some of these ways might be non-obvious, unfamiliar, or even distressing, especially if they conflict with the thinker's worldview (Arnold & Wade, 2017).

A holistic approach allows school leaders to find convergence as the missions of the schools they lead overlap with their altruistic tendencies. This merging of callings becomes their drive as school reformers. In the end, building leaders find inspiration from serving the needs of their students. Through the students' school view, they began to create knowledge for the organization. Learning, as a system, requires that they understand the nuance of the education process and are careful not to apply principles that do not fit (Rice, 2017). A systems dynamics perspective includes a high degree of operationality—a keen understanding of how action and relations lead to organizational

vitality. Schools viewed as a system are not a mechanism for predicting the future but rather for providing insights and reflections on how the multidimensional aspects of the school and its greater community work together (Norqvist & Ärlestig, 2021). A deeper understanding of the student experience and the factors that promote and inhibit inequities develops throughout the organization. Schools, when viewed as a system, began to buzz to life.

Managing the Boundaries

Strategic thinkers begin to recognize that their ability to influence the student learning experience is directly related to their ability to operate at the margins. It is at these margins that the concept of boundary-spanning roles evolves. Leaders began to link the organization with its environment through interactions among members and non-members. Everything outside the system's boundary defines its environment. The school's external environment can include parents, community members, school district personnel, government agencies, and other external entities the school relies on for many of its resources (Benolei & Schechter, 2017). Gatekeeping, the act of selecting and protecting what crosses the system's boundaries, becomes an essential role for systems leadership. The leader, as gatekeeper, identifies the relevant information and then determines and prioritizes how the organization focuses its resources (Ståhlkrantz & Rapp, 2020). While responding to social and political pressures, principals should buffer the staff from counterproductive policies, build school improvement initiatives that address external reforms, and meet the needs of the school's students and community. Failure to act at the boundaries allows outside influencers to adapt the education field to their needs (Benolei & Schechter, 2017). Principals, as systems leaders, must establish and maintain intra- and

inter-organizational learning. They ensure that the school structures and processes enable its members' collaborative learning to react effectively to dynamic environments and competing demands. A skilled systems thinker will recognize the system boundary density of each element and pick the appropriate components from the gray area for inclusion in the system of interest. An inexperienced systems thinker might extend the gray area too far (including irrelevant or extraneous items) or not far enough (failing to include critical elements and interactions) (Arnold & Wade, 2017).

The entrepreneurial nature of the boundary spanner reflects the view that traditional approaches and conventional practices do not apply to current policy problems and focus on the importance of developing new and practical solutions to complex problems (Ståhlkrantz & Rapp, 2020). Systems thinkers who focus on the boundary benefit from new ideas, innovation, creativity, experimentation, and lateral thinking as they engage the organization's learning cycle. Organizations have cognitive systems that enable them to acquire, perceive, and interpret information similarly, although not identical, to the individual learning process (Benolei & Schechter, 2017). Building leaders facilitate transferences across boundaries and build relationships, developing connections and interdependences that strengthen the school and the community. The leaders serve as the "cognitive filters" for the school (Ståhlkrantz & Rapp, 2020). They help members of the organization interpret the prevailing context and shape the perceptions and preferences of both individual and organizational learning.

Feedback Loops

Developing systems thinking should accompany the construction of a school-wide systemic approach. The dynamics of a systemic approach allow principals below the

surface. They can unpack the deeper patterns and relationships by recognizing the feedback loops responsible for creating dynamic interactions (Shaked & Schechter, 2020). Principals can intentionally construct artificial settings for the sole use of investigation. Designing conditions for experimentation allows the isolation of variables in the system. Isolating variables leads to the illumination of feedback loops as part of a circuit of cause-and-effect processes (Benolei et al., 2019). Feedback loops collect data that allows for understanding the system as a whole. It is necessary to recognize how the first event influences the second. The second event affects the first, leading to a circular series of events (Shaked & Schechter, 2018). It becomes difficult for the school leader to discern cause and effect. The interactions between events become a central element in understanding the system. Identifying and characterizing the relationships that drive the feedback loops is required (Norqvist & Ärlestig, 2021). The ability of the building leader to manage the feedback loop and direct the interactions between events directly correlates to goal attainment.

A systems thinker can recognize the strategic leverage points in a system and push these points in the right direction to influence system behavior. The application of systemic knowledge involves toggling the correct switches. Intentional lever operation is critical to successful systems work (Arnold & Wade, 2017). The leverage points include different types of flow and feedback loops. To improve the whole, systems thinkers optimize the interactions among the parts. They leverage the overlapping results in the management of the various exchanges. Typical results include improving performance, reducing conflicts, expanding delegation of responsibility, and overcoming resistance (Shaked & Schechter, 2020). Systems thinking emphasizes interrelations between system

components rather than the components themselves. In a high-functioning school system, leaders at all levels understand their and other leadership positions as skills connected to the organization's success and each of its parts (Norqvist & Ärlestig, 2021). Leaders work like musicians in a jazz band, riffing off each other. Each piece represents the ability of the leaders to recognize and pull the levers. No melody will be played identically from set to set. Yet, the audience will realize when the leaders are in sync or struggling to function as a system.

Learning Organizations

It is essential to recognize the complexity of school systems and their adaptability. The school acts as an organism that thrives by continuing to evolve to the environmental shifts. Scholars have increasingly recognized schools as systems exposed to external powers, such as the political and economic landscape influencing their day-to-day activities (Benolei et al., 2021; Noguera, 2008; Rice, 2017; Shaked & Schechter, 2020). In an era of escalating rates of change, to remain viable, organizations must be agile and flexible in the face of environmental, social, and cultural shifts (Jackson, 2006). How the school functions as part of an open system directly impacts the organization's ability to secure resources to support strategic goal attainment. Principals are called upon to maintain homeostasis between the school's internal and external environment (Benolei et al., 2019). Seemingly nonessential activities such as recess and extracurriculars can hold the system in balance. The fact that eliminating these activities would cause stress on the design and may jeopardize the system serves as a reminder of the systemic nature of schools (Rice, 2017). Much like a loose thread on the sweater, tugging one end without

regard to the entire garment can cause the whole thing to unravel. Conversely, paying specific attention to the fragility of a system can cause it to thrive.

A system succeeds by becoming resilient, instituting a hierarchy, and self-organizing; education systems are no exception (Rice, 2017). The various levels of responsibilities cause leaders to have different views and tasks. At the same time, connections, overlaps, and transparency must create good relationships and trust in the broader organization. What is said and done at each position in the system experiences an imbalance if the system is underdeveloped (Norqvist & Ärlestig, 2021). Healthy systems start as amorphous learning organizations. As the individuals in the system strengthen their knowledge of the interconnectedness of the organization, the system begins to evolve and take shape (Leithwood et al., 1998). Individual learning involves storing, retrieving, transforming, and applying information, which, in turn, relies on memory as a storage device. The organization files away everything people perceive and experience (Kim, 1997). The concept of learning organizations finds its base in the widely accepted understanding that an organization learns through the individual learning of its members (Benolei & Schechter, 2017). As the stakeholders in the school evolve in their knowledge of the systemic nature of the school, so does the organization's learning.

The phrase learning organization refers to the outcomes of the learning process, which may occur as the depth of understanding of the school's goals grows, desired results are shared, historical events of the school are understood, and changes in behavioral outcomes manifest themselves. The behavioral effects include strategic adjustments to standard operating procedures, routines, and performance (Benolei & Schechter, 2017). Principals, as the anointed caretaker of the school, must take

responsibility for the school's organizational learning. Using systems thinking, they integrate the school culture, instructional practices, and organizational structures centered on a shared school mission; by amalgamating these three spheres, a lively and progressing school emerges.

Systems Reform

Reforming a system requires placing gaps in student outcomes at the center of the work. Race-neutral approaches to systems leadership lead to deficit-based framing of diversity (Rigby et al., 2019). Socially just education requires asset-based structures and explicit recognition of the impacts of social injustice. There is a need for a more equitable and inclusive approach to education (Shields, 2010). There have been countless studies on the impact of leadership on student learning. However, a dearth of research goes beyond the ubiquitous race-neutral approaches (Smith & Gümüş, 2022).

Yet, schools and their leaders are held accountable for moderating the impacts of sociocultural inequalities. To create systems that level the playing field for students, educational leaders must shift their focus from all students to each and every student. Closely examining school achievement patterns reveals that conditions within them are crucial in shaping the academic outcomes they produce (Noguera, 2008). Leaders must shift the framing of deficits away from the students and their families to policies, procedures, and practices. They prioritize practices that humanize the learning and growth of each child (Ishimaru & Galloway, 2014). There is a multitude of factors that school staff can manipulate that would have a positive effect on student achievement (Noguera, 2008). None of them hold schools responsible for changing their students' cultural or social access. Creating systems that prove race, economic status, linguistic

ability, and neurodiversity are irrelevant to academic achievement requires strategic, diversity-affirming actions by school and district leaders.

Impact of Principals

Schools in the United States invest significant resources into principal recruitment, training, and retention. School principals oversee the day-to-day operations of the school as well as the long-term strategic direction of the school. Over the years, the role and expectations of principals have continued to metamorphosize. Gone are the times when the principal's primary responsibilities required merely operation and technical skills. With greater accountability for schools to show continuous gains in student performance as measured by standardized testing, school principals must lead in a transformational manner. As this shift has occurred, researchers have studied the impacts of principal leadership on academic performance.

A report commissioned by the Wallace Foundation examined the research on principal leadership impacting student learning. The researchers concluded from their investigation that leadership plays a highly significant and sometimes underestimated role in improving student learning (Grissom et al., 2021). The researchers concluded that replacing a below-average principal with an above-average principal would improve student reading and math scores by at least three months annually (Grissom et al., 2021). The researchers also looked at how effective principals spent their time. They found that principals who could create the most significant academic gains for students had instructionally focused interactions with teachers, built a productive school climate, facilitated collaboration, and strategically managed personnel and resources (Grissom et al., 2021). Perhaps most importantly, they examined leaders' impact on students in the

margins. The researchers concluded that principals must develop an equity lens to meet the needs of students traditionally marginalized by the education system (Grissom et al., 2021). Perhaps most important, the report highlights school leadership's positive and negative impact on student academic performance.

The impact of school leaders on student performance is not unique to the United States school structure. A group of researchers in Kuwait and the USA collaborated to examine the impact of a principal's leadership style on the school environment and student academic outcomes. They found a cause/effect, direct and indirect relationship between student outcomes and leadership styles. They found that an integrative leadership style in the USA promotes teacher collaboration and cooperation. Schools with integrative leaders show higher academic gains than schools with authoritative leaders (Al-Safran et al., 2014). However, unlike in the USA, principals in Kuwait that employed an authoritarian leadership style showed more significant academic gains than principals that used an integrative leadership style (Al-Safran et al., 2014). In Canada, researchers examined the impact of high school principals on the graduation rates and English exam scores of 12th-grade students. They found that principals significantly impact student outcomes when allowing for the time that a principal has to move a school. An effective principal with time to influence the culture and instruction at a school will have 2.6% higher graduation rates and 2.5% higher scores on English exams than an ineffective principal. They concluded that the principal must be in a school for three years to begin seeing their leadership's impact (Coelli & Green, 2012). A study out of Israel found that teacher cooperation and teamwork significantly affected student learning. Principals play a critical role in creating the culture and structures for teaming in school buildings. The

researchers concluded that the principal's role is to provide teachers with a clear framework and direction. Teachers under the principal's tutelage can improve instruction and student learning (Tubin, 2011).

As for research on systems thinking by principal leaders and student academic performance, there are significant gaps. Yet, a study out of Hong Kong on the strategic thinking skills of leaders shows promise. In the study, researchers sought to identify the strategic thinking skills of influential leaders. Researchers used the Strategic Thinking Questionnaire (STQ) to examine 543 school leaders. Using the STQ, researchers broke the results into three strategic thinking skills. One of the skills studied was systems thinking. They found a moderate and significant relationship between systems thinking and influential leaders (Pang & Pisapia, 2012). Leaders with a stronger disposition for systems thinking showed greater academic gain than principals who lacked systems thinking orientation.

The types and effectiveness of school leaders have a significant and measurable impact on student achievement across many school settings and in various contexts. Students marginalized by their school systems need researchers and practitioners to consider the relationship between leadership and academic outcomes. Additionally, more research is needed on the utilization of systems thinking by building leaders on the educational outcomes of students, specifically for students currently underserved by the modern American education system.

Strategic Actions

A principal's ability to lead the type of systemic change needed by the marginalized members of their school community depends on their capacity to think

strategically. Strategic thinking requires thoughtful planning, anticipation, and an understanding of actions' interdependency within a social system and implies focused coordination of resources (Benolei et al., 2019). Appreciating the organization often requires the systems thinker to step outside the system. Hovering above the system allows for a clearer picture to take focus. Using the insights from this elevated perspective allows a new understanding of the systems from the inside, allowing for intentional manipulation of the system structure. This approach encompasses the knowledge of systems, system structure, and dynamic behavior, all widely considered highly relevant aspects of systems thinking (Arnold & Wade, 2017). The principle of "structure influencing behavior" links to the other finding from research that those in decision-making positions can see the consequences of those decisions (Zulauf, 2007). Introducing leaders to systems thinking theory leads to a noticeable change in practice. Operating as strategic thinkers, principals recognize both the tools and the application. They can link their decision-making abilities to consequences, see the delays in a system, move away from blaming the external "others," and see how they contribute to an issue or problem (Zulauf, 2007). Knowing the impact of the structures on the system allows principals to manage the internal and external influences on the student learning experience.

Equitable Leadership

The heart of an organization beats deep within its chest, unseen yet creating an undulating rhythm that pulsates throughout the organization. The mission on the wall may profess a caring for the outcomes for all students. However, the hidden organ tells the true story of the school's commitment to equity. There is no "on" or "off" switch for equitable leadership practice. Instead, it is an ongoing process of learning and action.

Improvement work requires failures, iterations, and consistent small steps forward (Rigby et al., 2019). Systems thinking as a function of equity leadership leads to recognizing a systemic problem within the school, revealing a need for more precise coordination, and clarifying organizational positions and mandates. These systemic problems result in an extensive overhaul of the organization, in which commands and lines of decision-making must be changed and clarified (Norqvist & Ärlestig, 2021). Principals exercising equity leadership cannot avoid addressing the social conditions that produce and give meaning to disparities. The inequities that go unchallenged can have a powerful effect on beliefs and behavior. Therefore, for schools to produce academic outcomes demonstrating that race is irrelevant to academic achievement, they must address how racial identity and racial stereotypes are reinforced and even reproduced within educational settings (Noguera, 2012).

When those in power fail to assess the school system through a lens of equity, they risk shaping the school and its faculty as the unquestioned authority. Consequently, diversity in student thought, experience, and culture becomes the problem to be solved. Data analysis perpetuates a deficit view of students, developing a predisposition for how things are "typically" done in schools where the power lies with the adults inside the school rather than with the community. Seeing students as a problem to solve leads to a lack of connection with the public and a poor understanding of the historical and ongoing tension between the school and the community (Rigby et al., 2019). In a school operated by an equity-focused systems leader, the success or failure of students does not correlate with the amount of culture they do or do not possess. Instead, a close examination of achievement patterns at their schools may reveal conditions within them that play a

significant role in shaping the academic outcomes of their students (Noguera, 2012). A growing body of literature suggests organizational improvement around instruction, leadership, and racial equity is made through systematically changing structures and doing work in qualitatively different ways (Noguera, 2008; Rigby et al., 2019). Systems thinkers applying equity leadership recognize barriers to access and develop schema to create opportunities for equitable outcomes.

Conclusion

School principals, who face today's educational leadership complexities, would benefit from the holistic perspective of systems thinking (Shaked & Schechter, 2018). As leaders transition from teacher to teacher leader, assistant principal, and principal, they go through a predictable development pattern. When teachers are interested in their leadership growth, they enter the emergent leadership phase. The teacher takes on management and leadership responsibilities such as grade level leads, department heads, or chairing a committee. They transition into the established phase as they enter more formalized leadership roles. This phase usually finds the teacher transitioning into an administrative assignment, such as the dean of students or assistant principal. As the leader moves into the principal position, they enter the advanced leadership phase. School leaders reach maturity in their role and look to widen their experience, refresh themselves, and update their skills. As they begin to master their craft, principals get the urge to put something back into the profession by taking on training, mentoring, or other responsibilities. This evolution is the consultancy leadership phase (Shaked & Schechter, 2018). As principals progress through their developmental steps, their mentors, coaches,

and supervisors must recognize each stage and provide them with experiences that strategically increase their metacognition related to systems thinking.

Yet sadly, no amount of systems thinking matters if schools do not experience holistic changes. School reform requires a focus on factors that can create needed relief from oppression for their most impacted students. There is a lot that the nation could do to reduce poverty and racial segregation, from equalizing funding between the middle class and poor schools to lowering class size and ensuring the hiring of qualified and competent teachers (Noguera, 2008). The lack of understanding of the systemic nature of schools has been the failure of the reform movement in education. Reducing student outcomes to narrow measures of success has limited the natural experimentation that causes the school system to be resilient (Rice, 2017). Educational leaders need to openly address the highly politicized nature of the relationship between race and student achievement. They must convince their teachers, students, families, and community stakeholders that increasing minoritized students' accomplishment is not only possible but also necessary. Building leaders must move from the all-too-common tendency to perceive efforts to promote educational equity as a singular activity to realizing that system reform benefits all students. Concrete measures, such as increasing access for minority students to rigorous courses, improving the mentoring and counseling for students regarded as "at risk" of failure, and increasing stakeholder involvement in school-related reforms, are critical for schools looking to repair the harm created by systemic oppression. These initiatives are unlikely to result in short-term changes in academic outcomes. However, these strategies can result in incremental change and higher achievement rates for students of color in the future (Noguera, 2008). Framing

disparities and actions in race-explicit, systems-responsible, history-honoring ways are foundational to all equitable leadership practices at the systems level (Rigby et al., 2019). Principals' information processes reflect the capacity of principals to promote organizational learning through effective internal knowledge integration and valuable external information gathering. The interaction between the principal's contribution to the level of learning in schools and the broader system requires analysis, especially those exchanges that either foster or hamper the efforts made by principals to function in new and creative ways that promote equity (Benolei & Schechter, 2017).

Systems thinking as a theory for school leadership is an emerging area of interest for researchers. The impact of leadership from various levels in the organization needs to be better understood. The influence of organizational learning and its direct effect on student learning requires further examination. Additionally, researchers need to investigate how systems approaches to school leadership create sense-making and how systems leadership approaches can aid in developing communal leadership and social justice. Most importantly, current school structures lead to systemic inequities in student access and performance. Research is desperately needed to analyze the systems that lead to oppression and the types of leadership that relieve oppressive systems.

Chapter 3: Method

The primary question driving this study is how the building leader's ability to think at the systems level impacts the academic outcomes of students typically marginalized in the public education setting. Specifically, this study compares the measure of a building leader's systems thinking with the educational results for students who identify as Hispanic/Latino, Black/African American, and low-income households. This chapter contains the methodology for this investigation, including the participants, instrumentation, research design, and data analysis.

Purpose and Research Question

The key motivation for this study is "Can systems thinking by building leaders lead to positive academic outcomes for student groups that are typically marginalized by the current structures of the K-12 public education?"

Research Question 1: *Is there a difference in the student academic outcomes between schools led by building leaders with high systems thinking and schools led by building leaders with low systems thinking?*

Null Hypothesis: *There is no difference in the student academic outcomes between schools led by building leaders with high systems thinking and schools led by building leaders with low systems thinking.*

Research Hypothesis: *There is a statistically significant difference in the student academic outcomes between schools led by building leaders with high systems thinking and schools led by building leaders with low systems thinking.*

Research Question 2: *How prevalent is the use of systems thinking by building leaders?*

Research Question 3: *Is there a difference in outcome gap among marginalized students-in this study, referring to Black/African American students, Hispanic/Latino students, students qualifying for free and reduced lunch-between schools led by leaders with high systems thinking and schools led by building leaders with low systems thinking?*

Null Hypothesis: *There is no difference in the outcome gap among marginalized students-in this study, referring to Black/African American students, Hispanic/Latino students, students qualifying for free and reduced lunch-between schools led by building leaders with high systems thinking and schools led by building leaders with low systems thinking?*

Research Hypothesis: *There is a statistically significant difference in the outcome gap among marginalized students-in this study, referring to Black/African American students, Hispanic/Latino students, students qualifying for free and reduced lunch-between schools led by building leaders with high systems thinking and schools led by building leaders with low systems thinking?*

Research Design

The researcher surveyed over 700 K-12 public school principals along the I-5 corridor from as far south as Olympia and as far north as Marysville. The researcher targeted school districts that serve either metropolitan or suburban communities. Survey respondents evaluated themselves on their level of systems thinking based on the Principal Systems Thinking Scale (PSTS). Shaked, Schechter, et al. (2019) developed the PSTS to measure four significant ways principals apply the systems thinking approach the principal's ability to see the whole as an orientation to the big picture; the degree that

the principal knows that reciprocal influence is in play among the various school elements; the capacity of a principal to recognize the multiple aspects of a given issue simultaneously; the manner by which the principal prioritizes school life according to its importance to the school's central mission (Shaked, Schechter, et al., 2019). Shaked, Schecter, et al. (2019) found that respondents with a mean overall score of 3.51 or higher on the PSTS demonstrated a significant level of systems thinking. In addition to the principals' responses to the PSTS survey, the researcher added open-ended questions for principals to share how they apply leadership in their building. Using the PSTS survey and open-ended questions allowed for a mixed-method study.

Sources of Data

Smarter Balanced Assessment (SBA) scores measured the impact of the building leader's work. School and district leaders in Washington's K-12 public school system use SBA scores as their primary method for evaluating student academic outcome gaps. For this study, the researcher collected the SBA scores for all students, Hispanic/Latino students, Black/African American students, and students who qualified for free and reduced lunch. Scores from the previous four years of state testing were collected. These groups are of primary interest to the researcher as they are the student groups that often experience the most marginalization in public school systems. Unlike students receiving special education or English language development services, schools need more specific accountability measures for the identified student groups. Another parameter to further isolate the impact of the leader's systems thinking was only using responses for building leaders that had been principals in their building for four or more years.

Research Population

An assumption made by the researcher is that leaders who have been in their facility for less than four years have yet to have the time to create systems that would impact student performance. Students start taking the SBA in third grade and continue to take it through eighth grade. Students typically take the SBA in tenth grade for English/language arts and eleventh grade for math. Traditional school configurations along the I-5 corridor have students in elementary school through fifth or sixth grade, middle school in sixth or seventh grade through eighth or ninth grade, and high school in ninth or tenth grade through twelfth grade. Four years covers students' time in any school during the SBA assessment timeline.

Data Collection

During the winter quarter, the researcher sent surveys via email to 713 principals along the I-5 corridor. Eighty-eight principals took the PSTS survey. Additionally, the survey collected demographic data to allow categorization based on the principal's gender, years of experience, and years in the building. Of the 88 responses, 47 came from principals with at least four years in their schools. The researcher then collected the SBA scores of the students for the 2017-2018, 2018-2019, 2020-2021, and 2021-2022 school years. Washington state did not administer the SBA during the 2019-2020 school year because of the impact of the COVID-19 pandemic.

Methods of Data Analysis

The researcher conducted a quantitative data analysis using SPSS. Before the examination, the researcher screened the data to ensure assumptions of normality,

homogeneity of variance, and linearity. Demographic information and all variables used in this study were analyzed via descriptive analysis (e.g., mean, standard deviation).

Figure 2

General Diagram of the Quantitative Research Design

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┌──────────────┐     ╭─────────────╮     ╭─────────────╮     ┌────────────┐
│ Data Collected│     │    Data     │     │ Quantitativ │     │  Results   │
│ with          │ ──▶ │ Screened for│ ──▶ │ e Data      │ ──▶ │ Interpreted│
│ Survey        │     │ Assumptions │     │ Analysis    │     │            │
└──────────────┘     │ and         │     ╰─────────────╯     └────────────┘
                     ╰─────────────╯
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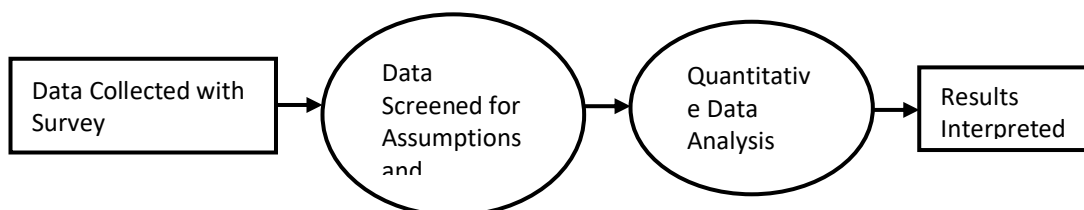
The researcher used an independent samples t-test to analyze the quantitative data. Principals in the upper quartile (PSTS score of 4.33 or higher) were classified as high systems thinkers. Principals scoring in the lower quartile (PSTS scores of less than 3.77) were classified as low systems thinkers. Student SBA scores for schools with high systems thinkers were compared with the SBA scores for schools with low systems thinkers. The researcher then looked for a mean difference between the two groups. Analysis was performed on results from all students, Black/African American students, Hispanic/Latino students, and the students receiving free and reduced lunch.

The responses to the open-ended questions were divided into their sub-characteristics and coded. The principals were then sorted into upper and lower quartiles based on their mean score on the PSTS. The coded responses were then arranged into themes based on the characteristics of systems thinking from the Arnold and Wade (2015) definition used for this paper. Systems thinking is the holistic approach to leading complex organizations that considers the *characteristics of the whole*, the

interconnectedness of the system's parts, and the *organization's core mission* (Arnold &

Wade, 2015). See Figure 3 for a representation of the qualitative approach.

Figure 3

General Diagram of Qualitative Research Design

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┌─────────┐   ┌──────────────┐   ┌───────────┐   ┌───────────┐   ┌───────────┐   ┌─────────┐
│ Survey  │ → │ Divided into │ → │ Responses │ → │ Principals│ → │ Arranged  │ → │ Results │
│Administere│  │     Sub      │   │   Coded   │   │  Sorted   │   │   into    │   │ Reporte │
│         │   │ Characterist │   │           │   │           │   │           │   │         │
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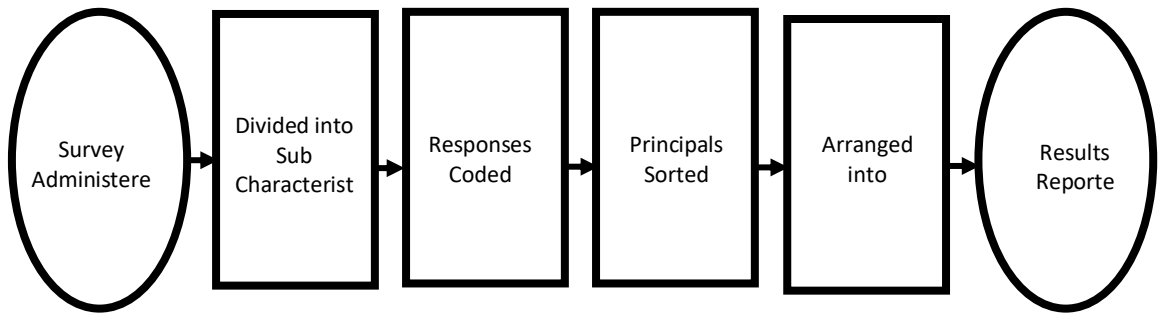
Chapter 4: Results

Chapter 4 contains the findings and the analysis undertaken for the raw data obtained from the Systems Thinking Survey, the responses to the open-ended questions, and the SBA data reported on the Washington State Report Card (*Washington State Report Card*, 2018). An explanation follows the findings and analysis of the data as it relates to the stated hypotheses. The chapter concludes with a summary. Tables and diagrams are provided to allow for ease and readability of the findings.

Survey Results

The researcher sent surveys to over 700 K-12 principals on the I-5 corridor in western Washington. The principals worked in districts as far north as Marysville and as far south as Olympia. Accompanying the survey was an explanation that the focus of the research was the impact of systems thinking by building on students typically marginalized by the education system. Participation in the survey was voluntary, and responses would be de-identified. The survey was open from January 10, 2023, to January 31, 2023. Follow-up reminders were sent about once a week while the survey was open. Eighty-eight responses were received for a response rate of 12.3%. Of the 88 surveys, 47 were usable for this study as they came from principals that had been in their building for at least four years. Of all the surveys received, 53.4% were usable for this study.

The first demographic question on the survey was gender. Respondents could identify as female, male, x, or prefer not to say. The results displayed in the Table 1 summarizes the responses for all respondents and for the respondents that were used in the survey. In both cases about two-thirds of the respondents were female. The most

frequent response for years of experience were four to seven years for both the surveys used and all returned surveys. While the majority response for years in the building was zero to three years. Those responses were not usable for the purpose of the survey. For the surveys that were usable the majority of the principal have spent four to seven years in their building.

Table 1

Demographic Characteristics

	All respondents		Respondents Used	
	n	%	*n*	%
Gender				
Male	33	37.1	17	36.2
Female	56	62.9	30	63.8
X				
Prefer Not to Say				
Years of Experience				
0-3	18	20.2		
4-7	29	32.5	17	36.2
8-11	11	12.4	7	14.9
12-15	16	18.0	11	23.4
15+	15	16.9	12	25.5
Years in Building				
0-3	39	43.8		
4-7	28	31.5	25	53.2
8-11	13	14.6	13	27.6
12-15	7	7.9	7	14.9
15+	2	2.2	2	4.3

Note. $n = 89$ for all respondents and $n = 47$ for respondents used for the study.

The responses to the PSTS prompts on the survey were averaged for each of the 47 usable responses. Each responding principal was assigned a system thinking score. Table 2 shows the distribution of the responses. The upper quartile had a median score of 4.33 and the lower quartile had a median score of 3.87.

Table 2

Distribution of Median PSTS Scores

Respondents Used		
	Median	4.14
	Standard Deviation	0.31
Percentiles		
	25th	3.87
	50th	4.14
	75th	4.33

Note. $n = 47$

      The four most recent years of SBA scores were collected for each school and separated by demographic. A score was then calculated for each demographic area by calculating the year-to-year growth in percentage and summing the growth. Table 3 shows the mean growth percentage scores on the reading and math SBA broken down by demographic.

Table 3

Distribution of Scores on SBA

		ELA	Math
All			
	Mean	7.36	11.00
	Standard Deviation	4.78	7.03
Black/ African American			
	Mean	7.14	-3.74
	Standard Deviation	18.14	15.50
Hispanic/Latino			
	Mean	6.41	10.80
	Standard Deviation	9.55	10.92
Low Income			
	Mean	3.60	7.24
	Standard Deviation	14.78	9.62

Note. $n = 47$ for all and Hispanic/Latino, $n = 46$ for low income, and $n = 26$ for

Black/African American

Quantitative Analysis

Before analyzing the relationships between the principals and the SBA scores in their schools, it was essential to ensure that the mean PSTS score for principals in the lower quartile significantly differed from the mean PSTS score for principals in the upper quartile. The Levene's Test for Equality of Variance was significant as the p-value of .024 is less than .05. An independent samples t-test was calculated comparing the mean PSTS scores from respondents in the lower quartile with the respondents in the upper quartile. A significant difference was found between the two groups, ($t(16.5) = -12.72, p < .001$). The mean on average for those who were in the lower quartile of systems thinking ($M = 3.77, SD = .10$) was significantly lower than those in the upper quartile of systems thinking ($M = 4.54, SD = .19$) with a mean difference of -.77 (95% CI [-.894 to -.939]).

Table 4

Means for Upper and Lower Quartile

	Quartile	N	Mean	Std. Deviation	Std. Error Mean
PSTS Average					
	Lower	12	3.77	0.10	0.03
	Upper	12	4.54	0.19	0.05

Table 5

PSTS Independent Samples Test

	Levene's Test for Equality of Variance		T-Test for Equality of Means								
						Significance				95% Confidence Interval of the Difference	
	F	Sig.	*t*	*df*	One-Sided *p*	Two-Sided *p*	Mean Difference	Std. Error Difference	Lower	Upper
PSTS Average Equal variance assumed	5.85	.024	-12.72	22	< .001	< .001	-7.67	0.06	-0.89	-0.64
Equal variance not assumed			-12.72	22	< .001	< .001	-7.67	0.06	-0.89	-0.64

To understand the relationship between the principal's system thinking score and the SBA scores earned by students in their school, independent samples t-tests were conducted. Principals were matched with the mean ELA and math growth for the students in their building. Principals and their corresponding SBA scores were placed into quartiles based on their mean scores on the systems thinking survey. An independent samples t-test was conducted comparing the upper and lower quartiles. Levene's Test of Equality of Variance was performed for each sample. Levene's Test was not significant as the p-values were greater than .05 for all data sets.

Table 6

ELA Independent Samples Test

	Levene's Test for Equality of Variance		t-test for Equality of Means							95% Confidence Interval of Difference	
					Significance						
					One-Sided p	Two-Sided p					
	F	Sig.	t	df			Mean Difference	Std. Error Difference		Lower	Upper
ELA All											
Equal variance assumed	.03	.875	.19	22	.426	.852	.41	2.17		-4.09	4.91
Equal variance not assumed			.19	2.00	.426	.852	.41	2.17		-4.09	4.91
ELA Black/African American											
Equal variance assumed	.26	.620	.14	14	.447	.894	1.20	8.75		-17.84	20.24
Equal variance not assumed			.14	2.20	.447	.895	1.20	8.75		-17.99	20.39
ELA Hispanic/Latino											
Equal variance assumed	1.43	.244	-.04	22	.484	.967	-.19	4.95		-9.72	9.34
Equal variance not assumed			-.04	8.82	.484	.967	-.19	4.95		-9.84	9.46
ELA Low Income											
Equal variance assumed	.56	.463	-2.59	21	.009	.017	-13.06	5.13		-23.99	-2.62
Equal variance not assumed			-2.590	0.72	.008	.016	-13.06	5.09		-23.90	-2.71

The results for the independent samples test for ELA were not significant for all areas except for students on free and reduced-price meals.

Table 7

Math Independent Samples Test

	Levene's Test for Equality of Variance		t-test for Equality of Means								
					Significance					95% Confidence Interval of Difference	
					One-Sided p	Two-Sided p	Mean Difference	Std. Error Difference	Lower	Upper	
	F	Sig.	t	df							
Math All											
Equal variance assumed	.001	.973	.10	22	.462	.923	.30	3.07	-6.07	6.67	
Equal variance not assumed			.10	21.82	.462	.923	.30	3.07	-6.07	6.67	
Math Black/African American											
Equal variance assumed	4.26	.058	-.21	14	.418	.836	-1.88	8.89	-20.93	17.18	
Equal variance not assumed			-.21	10.29	.419	.837	-12.88	8.89	-21.60	17.85	
Math Hispanic/Latino											
Equal variance assumed	.69	.417	.18	22	.428	.857	.83	4.51	-8.53	10.18	
Equal variance not assumed			.18	20.71	.428	.857	.83	4.51	-8.56	10.21	
Math Low Income											
Equal variance assumed	3.86	.063	-.02	21	.494	.987	-.07	4.48	-9.38	9.23	
Equal variance not assumed			-.02	20.32	.494	.987	-.07	4.42	-9.29	9.14	

The results for the independent samples t-test for math were not significant for all areas. Examining the confidence intervals for all non-significant independent samples t-tests could include zero. This suggests the difference between means could be zero and, therefore, no difference between the samples. Conducting bootstrapping was necessary to confirm the difference in mean populations.

Table 8

ELA Bootstrap for Independent Samples Test

		Bootstrap				
					95% Confidence Interval	
	Mean Difference	Bias	Std. Error	Sig. (2-tailed)	Lower	Upper
ELA All						
Equal variances assumed	.41	-.03	2.12	.823	3.89	4.60
Equal variances not assumed	.41	-.03	2.12	.823	3.89	4.60
ELA African American/Black						
Equal variances assumed	1.20	-.31	8.78	.895	16.20	18.61
Equal variances not assumed	1.20	-.31	8.78	.894	16.20	18.61
ELA Hispanic/Latino						
Equal variances assumed	-.19	-.04	4.55	.966	-8.44	9.51
Equal variances not assumed	-.19	-.04	4.55	.963	-8.44	9.51

Note. Bootstrap results are based on 1000 bootstrap samples.

Table 9

Math Bootstrap for Independent Samples Test

| | Bootstrap | | | | | |
| | | | | | 95% Confidence Interval | |
	Mean Difference	Bias	Std. Error	Sig. (2-tailed)	Lower	Upper
Math All						
Equal variances assumed	.30	.142	3.04	.921	-5.68	6.43
Equal variances not assumed	.30	.142	3.04	.920	-5.68	6.43
Math African American/Black						
Equal variances assumed	-1.88	.045[b]	8.98[b]	.821[b]	-18.34[b]	16.81[b]
Equal variances not assumed	-1.88	.045[b]	8.98[b]		-18.34[b]	16.81[b]
Math Hispanic/Latino						
Equal variances assumed	.83	-.008	4.46	.855	-7.85	9.89
Equal variances not assumed	.83	-.008	4.46	.856	-7.85	9.89
Math Low Income						
Equal variances assumed	-.072	-0.36	5.46	.993	-9.33	8.35
Equal variances not assumed	-.072	-0.36	5.46		-9.33	8.35

Note. Unless otherwise noted, bootstrap results are based on 1000 bootstrap samples.

[b]Based on 999 samples.

Summary of Quantitative Analysis

In all, eight independent samples t-tests were calculated. For the seven results where the 95% confidence intervals included zero, bootstrapping was utilized to compare the means. Non-significant differences were found for all the comparisons when examining the math SBA results and all the results for the ELA SBA except for the

students qualifying for free and reduced-price meals. An independent samples t-test with bootstrapping was calculated for the following samples and showed non-significant results:

- ELA All group, ($t(22)$= .65, p = .529). The mean on average for those who were in the lower quartile of systems thinking (M = 8.20, SD = 5.33) was not significantly higher than those in the upper quartile of systems thinking (M = 7.97, SD = 5.92), with a mean difference of 1.60, BCa 95% CI [-3.02, 6.44].

- ELA African American/Black group, ($t(14)$=.14, p = .894). The mean on average for those who were in the lower quartile of systems thinking (M = 8.09, SD = 20.16) was not significantly higher than those in the upper quartile of systems thinking (M = 6.89, SD = 14.96), with a mean difference of 1.20, BCa 95% CI [-16.05, 18.35].

- ELA Hispanic/Latino group, ($t(22)$ = -.53, p = .607). The mean on average for those who were in the upper quartile of systems thinking (M = 7.34, SD = 13.51) was not significantly higher than those in the lower quartile of systems thinking (M = 7.15, SD = 8.29), with a mean difference of 2.69, BCa 95% CI [-11.53, 8.21].

- Math All group, ($t(22)$ = .28, p = .785). The mean on average for those who were in the lower quartile of systems thinking (M = 11.88, SD = 7.85) was not significantly higher than those in the upper quartile of systems thinking (M = 11.58, SD = 7.18) with a mean difference of .96, BCa 95% CI [-6.09, 7.39].

- Math African American/Black group, ($t(14)$ = -.21, p = .839). The mean on average for those who were in the upper quartile of systems thinking (M = -

1.58, *SD* = 11.23) was not significantly higher than those in the lower quartile

of systems thinking (*M* = -3.45, *SD* = 22.48), with a mean difference of -1.88,

BCa 95% CI [-18.91, 16.22].

- Math Hispanic/Latino group, (*t*(22) = .54, *p* = .597). The mean on average for

  those who were in the lower quartile of systems thinking (*M* = 9.48, *SD* =

  12.35) was not significantly higher than those in the lower quartile of systems

  thinking (*M* = 8.65, *SD* = 9.57), with a mean difference of 2.54, BCa 95% CI

  [-6.62, 11.86].

- Math Low-Income group, (*t*(21) = 1.44, *p* = .086). The mean on average for

  those who were in the upper quartile of systems thinking (*M* = 7.57, *SD* =

  9.09) was not significantly higher than those in the lower quartile of systems

  thinking (*M* = 7.50, *SD* = 12.01), with a mean difference of 6.81, BCa 95% CI

  [-2.61, 15.87].

An independent samples t-test was calculated comparing the means of the upper and

lower quartiles of systems thinking for ELA SBA scores for students receiving free and

priced meals. A significant difference was found between the two groups (*t*(21) = -2.59, *p*

= .017). The mean on average for those in the upper quartile of systems thinking (*M* =

11.99, *SD* = 10.91) was significantly higher than those in the lower quartile of systems

thinking (*M* = -1.32, *SD* = 13.45) with a mean difference of 1.60, BCa 95% CI [-3.02,

6.44] with a mean difference of -13.31, BCa 95% CI [-23.99, -2.62].

Qualitative Analysis

Before developing the Principal Systems Thinking Scale, authors Shaked, H. et al.

(2019) engaged in qualitative research to pinpoint the characteristics of systems thinking

by building principals. Their findings varied slightly from earlier qualitative studies. They categorized the characteristics into four major themes:

- Openness to a variety of opinions

- Leading the whole

- Adopting multidimensional view

- Evaluating significance

Openness to a variety of opinions relates to the principal understanding of the need to see the big picture from various points of view. Principals adept at openness seek to understand the big picture, are willing to learn from and listen to others, and involve teachers in decision-making. Leading the whole refers to a principal's orientation to the big picture. Principals that lead the whole see the school as one extensive system, tolerate ambiguity and uncertainty, and organize confusing details into a single vision. Adopting a multidimensional view means looking at an issue from several angles simultaneously. Principals displaying a multidimensional view consider the issues before acting, exercise indirect influence, and motivate staff through responsibility. Evaluating significance is the principal's ability to see school life in accordance with the entire system. Principals prioritize significance based on urgency and importance, identify patterns, and balance internal and external forces.

The survey for this study included open-ended questions intended to evaluate the respondent's orientation to the four teams identified by authors Shaked, H. et al. (2019). The question, "Please describe a time in your principalship you were faced with uncertainty or ambiguity. What determined your next steps?" attempted to identify a principal's ability to lead the whole. "What factors influence your development of a

shared vision?" analyzed the principal's openness to various opinions by learning how respondents used multiple points of view to create a big picture. The characteristic of adopting a multidimensional view was addressed by the question, "When faced with a big decision related to your school leadership, how do you seek out multiple points of view?" The researcher evaluated responses for consideration of multiple points of view and awareness of indirect influences. "When faced with multiple issues and seemingly competing interests, how do you prioritize your efforts?" allows the researcher to assess the respondent's ability to manage the system's boundaries and prioritize competing priorities. These characteristics are critical to a leader's ability to evaluate the significance of their actions.

Finally, the survey asked respondents, "What role does systems thinking play in your leadership philosophy?" The last question permits an overall assessment of the principal's understanding of systems thinking. To unpack this question, systems thinking was defined as a holistic approach to leading complex organizations that considers the characteristics of the whole, the interconnectedness of the system's parts, and the organization's core mission (Arnold & Wade, 2015). Respondents should demonstrate a philosophy that considers this holistic approach. The characteristics of systems thinking were used as the themes for the deductive coding of the first four questions. "Lack of Big Picture," "No Eye for Details," and "Lack of Clear Vision" was chosen by the researcher to describe a response that was a non-example of characteristics of the whole, the interconnectedness of the system's parts, and organization's core mission, respectively.

Table 10

Themes Used for Deductive Coding

	Characteristics of the Whole	Interconnectedness of the Systems Parts	Organizations Core Mission
Example	Characteristics of the Whole	Interconnectedness of the Systems Parts	Organizations Core Mission
Non-Example	Lack of Big Picture	No Eye for Details	Lack of Clear Vision

Qualitative Results

The researcher read the responses to the open-ended questions and coded the responses. The open-ended questions (see Appendix H) were:

- Please describe a time in your principalship you were faced with uncertainty and ambiguity. What determined your next steps?

- What factors influence your development of a shared vision?

- When faced with a big decision related to your school leadership, how do you seek out multiple points of view?

- When faced with multiple issues and seemingly competing interests, how do you prioritize your efforts?

The codes were then analyzed for themes (see Appendix I). The analysis of the codes uncovered several themes related to systems thinking. Table 11 shows the themes of the respondents from the upper quartile for the question related to leading the whole. Table 12 provides the frequency of the responses from the principals in the upper quartile. Table 13 shows the themes of the respondents from the lower quartile for the question related to leading the whole. Table 14 provides the frequency of the responses from the principals in the lower quartile.

Table 11

Leading the Whole Themes for Upper Quartile

Respondent #	School as One Large System	Tolerate Ambiguity and Uncertainty	Creates a Single Vision
7		Organizations Core Mission	Interconnectedness of Systems Parts
10	Interconnectedness of Systems Parts	Organizations Core Mission	Organizations Core Mission
10			Interconnectedness of Systems Parts
12		Lack of Clear Vision	
13		Characteristics of the Whole	Organizations Core Mission
13		Organizations Core Mission	
21	Interconnectedness of Systems Parts		Interconnectedness of Systems Parts
21	Characteristics of the Whole		
22			Organizations Core Mission
27	Characteristics of the Whole		
28		Lack of Clear Vision	
37	Lack of Clear Vision	No Eye for Details	Lack of Big Picture
53			Interconnectedness of Systems Parts
64			Interconnectedness of Systems Parts
67	Characteristics of the Whole		Organizations Core Mission
70		Lack of Clear Vision	Organizations Core Mission
70		Organizations Core Mission	Interconnectedness of Systems Parts

Table 12

Frequency for Upper Quartile in Leading the Whole

Characteristics of the Whole	Interconnectedness of Systems Parts	Organizations Core Mission
4	8	9
Lack of Big Picture	No Eye for Details	Lack of Clear Vision
1	1	4

Table 13

Leading the Whole Themes for Lower Quartile

Respondent #	School as One Large System	Tolerate Ambiguity and Uncertainty	Creates a Single Vision
29			Lack of Clear Vision
43	Characteristics of the Whole	Interconnectedness of Systems Parts	
43	Characteristics of the Whole	Interconnectedness of Systems Parts	Organizations Core Mission
52			Organizations Core Mission
66		Lack of Big Picture	Organizations Core Mission
81		Lack of Big Picture	Interconnectedness of Systems Parts

Table 14

Frequency for Lower Quartile in Leading the Whole

Characteristics of the Whole	Interconnectedness of Systems Parts	Organizations Core Mission
2	3	3
Lack of Big Picture	No Eye for Details	Lack of Clear Vision
2	0	1

Table 15 shows the themes of the respondents from the upper quartile for the question related to a variety of opinions. Table 16 provides the frequency of the responses from the principals in the upper quartile. Table 17 shows the themes of the respondents from the lower quartile for the question pertaining to variety of opinions. Table 18 provides the frequency of the responses from the samples of principals in the lower quartile.

Table 15

Variety of Opinions for Upper Quartile

Respondent #	Understand the Big Picture	Learn and Listen to Others	Involve Teachers in Decision Making
7	Organization Core Mission	Interconnectedness of Systems Parts	
10	Organization Core Mission		Lack of Big Picture
12	Characteristics of the Whole		Characteristics of the Whole
13	Organization Core Mission		Organizations Core Mission
13			Organizations Core Mission
13			Organizations Core Mission
17	Interconnectedness of Systems Parts		
21	Interconnectedness of Systems Parts	Organizations Core Mission	
22		Organizations Core Mission	
27	Organization Core Mission		
28		Organizations Core Mission	
37		Interconnectedness of Systems Parts	
53		Lack of Clear Vision	
64			Lack of Big Picture
67			Organizations Core Mission
70		Interconnectedness of Systems Parts	

Table 16

Frequency for Upper Quartile in Variety of Opinions

Characteristics of the Whole	Interconnectedness of Systems Parts	Organizations Core Mission
2	5	7
Lack of Big Picture	No Eye for Details	Lack of Clear Vision
2	0	1

Table 17

Variety of Opinions for Lower Quartile

Respondent #	Understand the Big Picture	Learn and Listen to Others	Involve Teachers in Decision Making
1	Organizations Core Mission		
11		Characteristics of the Whole	
29		Interconnectedness of Systems Parts	
43	Interconnectedness of Systems Parts		
52	Organizations Core Mission		
60		Lack of Clear Vision	
62	Characteristics of the Whole		
66	Lack of Clear Vision		
81	Interconnectedness of Systems Parts		

Table 18

Frequency for Lower Quartile in Variety of Opinions

Characteristics of the Whole	Interconnectedness of Systems Parts	Organizations Core Mission
2	3	2
Lack of Big Picture	No Eye for Details	Lack of Clear Vision
0	0	2

Table 19 shows the themes of the respondents from the upper quartile for the question related to the multidimensional view. Table 20 provides the frequency of the responses from the principals in the upper quartile. Table 21 shows the themes of the respondents from the lower quartile for the question about the multidimensional view. Table 22 provides the frequency of the responses from the principals in the lower quartile.

Table 19

Multidimensional View for Upper Quartile

Respondents #	Consider Issue Before Acting	Exercise Indirect Influence	Motivate Staff Through Responsibility
7	Interconnectedness of Systems Parts		
10	Interconnectedness of Systems Parts		
12	Interconnectedness of Systems Parts	Organizations Core Mission	
13	Interconnectedness of Systems Parts		
17	Lack of Big Picture		
21	Interconnectedness of Systems Parts	Lack of Big Picture	
22	Interconnectedness of Systems Parts		
27	Interconnectedness of Systems Parts		
27	Interconnectedness of Systems Parts		
28	Interconnectedness of Systems Parts		
27		Organizations Core Mission	
53	Interconnectedness of Systems Parts		
64	Interconnectedness of Systems Parts		
67		Organizations Core Mission	
70	Interconnectedness of Systems Parts	Interconnectedness of Systems Parts	

Table 20

Frequency for Upper Quartile in Multidimensional View

Characteristics of the Whole	Interconnectedness of Systems Parts	Organizations Core Mission
0	13	3
Lack of Big Picture	No Eye for Details	Lack of Clear Vision
2	0	0

Table 21

Multidimensional View for Lower Quartile

Respondents #	Consider Issue Before Acting	Exercise Indirect Influence	Motivate Staff Through Responsibility
1		Interconnectedness of Systems Parts	
11	Interconnectedness of Systems Parts		
29	Lack of Clear Vision		
43	Interconnectedness of Systems Parts		
52	Characteristics of the Whole		
60	Lack of Big Picture		
62	Characteristics of the Whole		
66	Lack of Big Picture		
81	Lack of Big Picture		
81	Characteristics of the Whole		
87	Characteristics of the Whole		

Table 22

Frequency for Lower Quartile in Multidimensional View

Characteristics of the Whole	Interconnectedness of Systems Parts	Organizations Core Mission
4	3	0
Lack of Big Picture	No Eye for Details	Lack of Clear Vision
3	0	1

Table 23 shows the themes of the respondents from the upper quartile for the question related to evaluating significance. Table 24 provides the frequency of the responses from the principals in the upper quartile. Table 25 shows the themes of the respondents from the lower quartile for the question about evaluating significance. Table 26 provides the frequency of the responses from the samples of principals in the lower quartile.

Table 23

Evaluating Significance for Upper Quartile

Respondents #	Prioritizing Based on Urgency	Prioritizing Based on Importance	Identify Patterns	Balance Internal and External Forces
7	Organizations Core Mission	Interconnectedness of Systems Parts		Interconnectedness of Systems Parts
10			Organizations Core Mission	Interconnectedness of Systems Parts
10			Organizations Core Mission	
12		Organizations Core Mission	Lack of Clear Vision	
13	Characteristics of the Whole	Lack of Clear Vision		
21	Lack of Big Picture	Organizations Core Mission		
22		Organizations Core Mission	Interconnectedness of Systems Parts	
27		Organizations Core Mission		
28				Characteristics of the Whole
37	Organizations Core Mission	Characteristics of the Whole		Characteristics of the Whole
37				Characteristics of the Whole
53		Organizations Core Mission		
64		Interconnectedness of Systems Parts		
67		Organizations Core Mission		

Table 24

Frequency for Upper Quartile in Evaluating Significance

Characteristics of the Whole	Interconnectedness of Systems Parts	Organizations Core Mission
5	5	10
Lack of Big Picture	No Eye for Details	Lack of Clear Vision
1	0	2

Table 25

Evaluating Significance for Lower Quartile

Respondents #	Prioritizing Based on Urgency	Prioritizing Based on Importance	Identify Patterns	Balance Internal and External Forces
11		Organizations Core Mission		
29		Organizations Core Mission		Characteristics of the Whole
43		Organizations Core Mission		Characteristics of the Whole
43		Organizations Core Mission		
52		Organizations Core Mission	Organizations Core Mission	
60		Organizations Core Mission	Organizations Core Mission	
62		Organizations Core Mission		
66		Organizations Core Mission		
81			Interconnectedness of Systems Parts	Organizations Core Mission

Table 26

Frequency for Lower Quartile in Evaluating Significance

Characteristics of the Whole	Interconnectedness of Systems Parts	Organizations Core Mission
2	1	11
Lack of Big Picture	No Eye for Details	Lack of Clear Vision
0	0	0

Summary of Qualitative Analysis

In the first question, principals were asked to describe a time in their principalship when they faced uncertainty and ambiguity. This question was intended to determine how principals utilized systems thinking to handle uncertainty. Answers from principals in the upper quartile (see Table 11) showed a much higher focus rate on the system's interconnectedness and the organization's mission than principals in the lower quartile

(see Table 13). A review of Tables 12 and 14 shows that responses were distributed across all three sub-characteristics of leading the whole. As stated earlier, the sub-characteristics are school as one extensive system, tolerating ambiguity and uncertainty, and creating a single vision. Responding to the question, Respondent #66, from the lower quartile, stated, "having to fit students into the programing language based on the CBA language that might conflict with what the student needed." This type of response shows a lack of understanding of the systemic nature of school leadership. Instead, the response shows a passive approach by allowing contract language to serve as a barrier to helping students. Comparatively, Respondent #67, from the upper quartile, described their handling of uncertainty as "set forth a new set of steps to provide support for the teachers, modified systems for management, partnerships with outside organizations and development of core staff." Respondent #67 identifies a more holistic approach to their leadership.

A critical attribute of any leadership position is creating a shared vision. In the survey, principals were asked what factors influenced their development of a shared vision. Utilizing a systems thinking approach requires understanding the big picture, learning from and listening to others, and involving teachers in decision-making. In Table 15, principals in the upper quartile showed responses fitting into all three sub-characteristics. On the other hand, principals in the lower quartile (see Table 17) did not report involving teachers in their decision-making. Respondent #11, from the lower quartile, stated, "Trying to connect with, listen to, and empower all that are involved and connected to the school." The principal seems to know that bringing others into the vision work is good, yet lacks a clear plan. Conversely, from the upper quartile, Respondent #10

states, "Input from our Instructional Planning Team (teacher leaders) that are in alignment with our district mission and vision and taking into consideration where we have been with our annual action plan work and what are the logical next steps." This response shows an ability to focus on the big picture and the details.

Any strong leader recognizes the need to collect multiple and sometimes competing viewpoints when making big decisions. This is true of principals exercising systems thinking. Principals were asked to describe how they did this in question number three of the survey. Respondent #7 stated, "I bounce things off lots of teachers, ask several folks in my position in other buildings, and talk with my boss." Respondent #13 stated, "I consult our assistant principal, my learning improvement officer, our school lead team, which consists of grade-level leaders. I also consult our parent advisory and student advisory as appropriate." The scope of input solicitation described by respondents #7 and #13 was typical of principals in the upper quartile. Table 19 shows that principals in the upper quartile firmly focused on the interconnectedness of systems parts when seeking multiple viewpoints.

Principals in the lower quartile had less thought-out approaches to seeking multiple points of view. Respondent #43 said, "By talking to different grade levels and types of staff to gain input." Respondent #29 stated, I really rely on my colleagues both in my district and beyond. I also rely on our building leadership team." As seen here, principals in the lower quartile recognized the need to ask other people but often didn't describe a system for doing so. Principals in the lower quartile made almost no effort to exercise indirect influence (a sub-characteristic of the multidimensional view). Instead, their actions were exclusively spent analyzing the issue before acting (see Table 21).

Principals in the upper and lower quartile did not describe the sub-characteristic of motivating staff through responsibility in their responses.

The fourth question asked principals to describe how they evaluated the significance of their decisions. The four sub-characteristics are prioritizing based on urgency, prioritizing based on importance, identifying patterns, and balancing internal and external forces. As seen in Table 26, principals in the upper quartile had responses that fell into all four categories. Principals in the lower quartile's responses were mainly categorized as prioritizing based on importance, focusing on the organization's core mission (see Tables 23 and 25). Many of the principals in the lower quartile often stated that they do "what is best for students" without a clear explanation of how they know or what they do. Respondent #11 said it most simply by answering, "It is always about what is best for students." Respondent #29 attempted to elaborate, "I really try to do my best to stay student-centered and what outcome(s) is/are best for our students." Principals in the upper quartile also described a focus on students. However, they were able to elaborate a little more on their approach. Respondent #12 described using data, "What does the data say and what is best for kids-this leads all decision making." Respondent #13 gave a more detailed answer, "Deadlines and due dates often lead to prioritization, ensuring students and staff are physically and emotionally safe always are priorities, and often urgent matters jump the line during the day and have to be dealt with." As seen in Table 24 and #13's responses, principals in the upper quartile utilized a more complete systems thinking approach when addressing the fourth question.

The final question asked principals to describe the role systems thinking played in their leadership philosophy. Many principals had difficulty addressing this question.

Respondent #66 stated: "I am sure it is there, but I would say that it isn't consciously there." While respondent #34 stated: "To be honest, I'm not clear on what 'systems thinking' is. I don't want to assume it's synonymous with collaboration." However, some respondents with a high PSTS score seemed to have a grasp of systems thinking. Respondent #10 stated: "I hope you can see that in my responses above, systems thinking is paramount because our educational system is complex. Our students and families simply will not benefit from isolated teams or even district departments, handing down isolated initiatives and mandates without consideration for the whole." Yet another principal addressed the feedback loops embedded in systems, "I feel like I am always thinking of the system. Each action we take, or a lack of action has the potential to have multiple positive or negative effects. I believe the more we help others see the way our work is connected the more buy-in we get because they better understand the ripple effect of their effort." Furthermore, evaluating the themes from the entire sample in Table 16, respondents were aware of the system consisting of wholes and parts (Arnold & Wade, 2015). Yet, they largely lacked awareness of the role feedback loops and boundaries play in the principal role (Benolei & Schechter, 2017). As shown in Table 27, respondents from the lower quartile were balanced in the components of systems thinking. However, they utilized them at a much lower rate than principals in the upper quartile. Responses from principals in the upper quartile skewed towards focusing on the organization's parts and the core mission.

Table 27

Frequency of Responses Across All Questions for Examples of Systems Thinking

	Characteristics of the Whole		Interconnectedness of the Systems Parts		Organizations Core Mission	
	Upper Quartile	Lower Quartile	Upper Quartile	Lower Quartile	Upper Quartile	Lower Quartile
Leading the Whole	4	2	8	3	9	3
Variety of Opinions	2	2	5	3	7	2
Multidimensional View	0	4	13	3	3	0
Evaluating Significance	5	2	5	1	10	11
Total	11	10	31	10	29	16

Chapter 5: Discussion

This study was an attempt to identify the level of principals' systems thinking and compare those results with their students' performance on the annual Smarter Balanced Assessment in reading and math. Of specific interest in the study was the impact on students identifying as African American/Black, Hispanic/Latino, or qualifying for free and reduced lunch. The researcher hoped to identify principals making systemic improvements in their schools that benefited students historically marginalized by the monolith of public schools. A strong relationship between systems thinking and eliminating student outcome gaps could help persuade schools, districts, and universities to re-evaluate how they train, select, develop, and mentor school leaders.

Summary of Findings

The study attempted to address three research questions. *Is there a difference in the student academic outcomes between schools led by building leaders with high systems thinking and schools led by building leaders with low systems thinking? How prevalent is the use of systems thinking by building leaders? Is there a difference in outcome gap among marginalized students-in this study, referring to Black/African American students, Hispanic/Latino students, students qualifying for free and reduced lunch-between schools led by leaders with high systems thinking and schools led by building leaders with low systems thinking?* The data collected from the study was inconclusive. However, there were some interesting findings from the research related to each question.

The researcher hypothesized a positive relationship between the utilization of systems thinking and student academic outcomes. That data failed to prove this hypothesis. The mean academic growth as measured by the ELA and math SBA for

students with principals in the lower quartile was 8.20 and 11.88, respectively. At the same time, the mean academic growth for students in the upper quartile was slightly lower, with a score of 7.97 for ELA and 11.56 for math. Using an independent samples t-test, these mean differences were statistically non-significant. Both upper and lower-quartile principals reported keeping their staff and students at the center of their decision-making. However, principals in the upper quartile relied more on understanding the system's parts than principals in the lower quartile. When asked what informed their decision-making, Respondent #70 stated, "Data! Listening to various stakeholders then building upon data and feedback." Data utilization allows leaders to fully understand the student learning experience (Datnow & Park, 2018). Data utilization enables principals to look for the friction created by the invisible interactions within the parts of the system. These areas of friction become levers for improving the function of the system.

The absence of significant academic performance didn't mean there wasn't a significant difference in systems thinking by school principals. The evaluation of principals in the upper quartile had a mean PSTS mean score of 4.53, while principals from the lower quartile had a mean score of 3.77. In developing the PSTS benchmark for systems thinking, the authors identified the mean score for systems thinking as 3.51 (Shaked, Schechter, et al., 2019). They had teachers evaluate the perceived systems thinking of their principals. For this study, principals were asked to reflect on their leadership practices. The differences in the mean scores between this study and the study by Shacked, Schechter, et al. (2019) could be attributed to the perception of self and how leaders are perceived.

Additionally, this study considered a different population of principals than the survey's authors accessed. However, it was clear from this study that there were significant differences in systems thinking by principals. An evaluation of the answers to the open-ended questions further bore this hypothesis. When demonstrating openness to a variety of opinions, principals in the upper quartile were more likely to consider the organization's core mission than principals in the lower quartile. With diversity in student demographics increasing in the public schools on the I-5 corridor at a greater rate than the diversity of the staff (*Washington State Report Card*, 2018), principals that demonstrate a propensity for staying mission-focused in their leadership have the opportunity to consider more of the factors that influence the school system.

Individual responses to the question, "What role does systems thinking play in your leadership philosophy?" indicated that many respondents didn't grasp systems thinking. Principals in the lower quartile shared several responses that showed a vague understanding. Examples of those responses included Respondent #52 stating, "Continually working on systems…need to be better at it, and Respondent #43 stating, "Systems create structure and safety for staff. If they know 'if/then' it helps build predictability." It is as if they know they should be able to think at the systems level, yet they lack the structure to toggle between the big-picture view of the whole and the interconnectedness of the parts. Even among principals in the upper quartile, several respondents seemed to grasp systems thinking only partially. Respondent #21 illustrated this partial understanding: "Systems prevent the slip-throughs or falling through the cracks." Respondent #21 equates systems thinking with having the day-to-day structures in place for a smooth, functioning school. Systems thinking is the understanding that

organizations are complex systems where you can't focus on a single thing as everything is interconnected (Sterman, 2001). While this level of thinking was in short supply in the principal responses, Respondent #67 seemed to have a strong grasp of systems thinking by stating, "Systems for principals are different than for teachers. Teachers see systems as moment-to-moment movements. I see it as how we can continue to focus on building goals and the relationship between materials, instruction, behavior management, home/school connections, equity, etc. …". This nuanced grasp of systems thinking seems in short supply among the entire sample, including principals in the upper quartile.

Public schools throughout the I-5 corridor see disproportionate academic outcomes for students based on their race and income level (*Washington State Report Card*, 2018). A vital interest of this study was to investigate the possibility of a relationship between systems thinking and closing of outcome gaps for students identifying as African American/Black, Hispanic/Latino, or qualifying for free and reduced lunch. When comparing student scores on the ELA and math SBA between principals in the upper and lower quartile, most populations had no difference in improvement mean scores.

The lone exception was the ELA scores for students qualifying for free and reduced lunch. The mean improvement for students whose principal scored in the upper quartile for systems thinking was 11.99. The mean improvement score for students whose principals scored in the lower quartile was -1.32. The difference in these two means was statistically significant using an independent samples t-test. When looking at the mean ELA SBA growth percentages for the whole population, students whose principals scored in the lower quartile had a mean of 8.20. Students whose principals scored in the upper

quartile on the PSTS had a mean ELA SBA growth percentage of 7.97. These mean differences were not significant. The larger mean difference seen for students receiving free and reduced lunch supports the researcher's hypothesis that there is a relationship between the use of systems thinking and the narrowing of the outcome gap for students identified as low-income compared to the school population as a whole.

Furthermore, when evaluating principals' responses to the open-ended questions, the researcher found that only a few principals reported considering how their leadership may impact the marginalized students in their school. Most principals reported doing "what's best for students" without making a clear distinction or recognizing the potential differential impact of their efforts on student groups in their school. On the other hand, a few responses demonstrated the differentiated leadership personified by systems thinking. When asked, "When faced with multiple issues and seemingly competing interests, how do you prioritize your efforts?", Respondent #20 stated, "Using the impact to students, especially those in marginalized groups, as the primary lens." Respondent #60 said, "I try to keep in mind our SIP goals and consider how the most vulnerable students are impacted." These responses are in sharp contrast with the more common answer exemplified by the answer from Respondent #62, "Keeping the mission/vision of supporting ALL students at the forefront of the decision." The research found that thinking about all students without consideration for each student was an example of principals failing to grasp the systemic nature of their schools. While the issues of race and income go far beyond the school walls, the ability to make marked changes in school achievement lies firmly within the spheres of influence and control of educators (Noguera, 2008). This study serves as an example of the difficulty of making changes as

leaders continue to give service to "best for students" without attending to each and every student's needs. Building leaders must be able to simultaneously recognize the big picture and the interconnectedness that the parts of the system have on student outcomes.

Limitations of the Research

This study has many limitations. The SBA is not intended to be a measure of principal leadership. A litany of factors impacts student academic achievement, and it is difficult to distill the impacts of one aspect on gains or losses in performance. Furthermore, the time captured in this study covered the COVID-19 pandemic. During this time, the state suspended the administration of the SBA for one year and made holistic changes to the test. It is too early to tell if the pandemic further exacerbated the gap in academic access for marginalized student groups. However, it is safe to say that the pandemic significantly impacted student learning for several years.

Moreover, many principals cited the pandemic in their responses to the survey. Another limitation is the lack of quantitative research on the impact of systems thinking by principals. The few studies that are out there point to clear differences in systems thinking skills among principals (Benolei et al., 2021; Norqvist & Ärlestig, 2021; Shaked & Schechter, 2014, 2017). However, no studies were found that attempted to look for a relationship between student academic performance and a principal's systems thinking.

This study relied on principals self-reporting their systems thinking. Short-answer responses from principals demonstrated a limited understanding of systems thinking. The lack of systems thinking knowledge may impact their day-to-day leadership and their ability to respond to some of the open-ended questions. Additionally, principals may have a more favorable view of their systems thinking than could be measured by their impact

on their student's achievement. This was exemplified by the limited number of respondents that fully grasped the intricacies of systems thinking.

Implications for Practice

Despite the limitations identified, this study and the body of emerging research on systems thinking by school leaders provide promise when thinking about improving leadership practices (Benolei et al., 2019, 2019, 2021; Norqvist & Ärlestig, 2021; Shaked & Schechter, 2017; Shaked, Schechter, et al., 2019). Principal preparation programs could increase the training of their graduates by incorporating the tenants of systems thinking into their leadership training. The study should help school education programs recognize the limited impact of focusing on instructional leadership. As principals are taught to do "what's best for kids," they must also be exposed to managing their schools' boundaries—the spaces where community, society, race, academics, and instruction interact. Leading in the margins is a critical responsibility for school leaders (Benolei & Schechter, 2017). The principal must gain the ability to see both the forest and trees simultaneously.

Superintendents and other supervisors of principals should explicitly mentor their principals on the four characteristics of systems thinking in the book *Leading Holistically: How Schools, Districts, and States Improve Systemically* edited by Haim Shaked, Chen Schechter, and Alan J. Daly. In there they suggest, "The screening tool may also be used by superintendents to determine which principals have not adequately acquired ST capacities and even suggest which necessary professional development process should be tailored to the specific principal" (Shaked, Schechter, et al., 2019). As the authors suggest in their work, this study should shed light on the limited level of

systems thinking at the building level and provide direction for those wishing to improve systemic approaches to leadership.

Finally, hiring administrators and committees should be taught to look for leaders who exhibit openness to various opinions, leading the whole, adopting a multidimensional view, and evaluating significance. By explicitly selecting these categories, they can influence the number of principals applying systems thinking to their practices. Aspiring principals should be required to demonstrate holistic leadership before ascending to the role of building leader (Shaked & Schechter, 2018). This could include using data to impact student performance, demonstrating a pattern of seeking information from multiple stakeholders when making decisions and incorporating students' voices into their leadership. Most importantly, they should be able to attend to the whole while considering the interconnectedness of their leadership while attending to the needs of marginalized students and their families. With the ability to impact student learning outcomes squarely inside the walls of the school, the recent emergence of systems leadership holds implications for equitable outcomes for each and every student.

Recommendations for Research

The area of systems thinking by educational leaders is still an emerging area of research. Several qualitative studies look at systems thinking by principals. However, there is a dearth of quantitative or qualitative studies examining the relationship between systems thinking and student academic performance. As shown by this study, the ability to attribute student learning to the administrator's efforts can be complicated. However, over the years, researchers have successfully demonstrated how principals impact student learning (Al-Safran et al., 2014; Coelli & Green, 2012; Grissom et al., 2021). Researchers

should apply these methods to study the role systems thinking has on student academic performance.

Additionally, as long as there are persistent systemic gaps in academic performance based on the race and income level of students and their families, researchers should devote their energy to the areas in the school that impact access and outcomes. One of those areas is most certainly school leadership. Additional studies are needed to examine the relationship between systems thinking, its characteristics, and the outcome and opportunity gaps that minoritized communities face.

Conclusion

Working through the literature and research data for this study has brought to light the limited work and understanding of systems thinking by public school educators. Many educators profess to be systems leaders and big-picture thinkers. However, the research for this study has shown that it is less common than people might think. Furthermore, several definitions remain even among the experts on systems thinking research. Arnold and Wade (2015) define systems thinking as "a set of skills used to improve the capability of identifying and understanding systems, predicting their behaviors, and devising modifications to them to produce desired effects." Sterman (2001) describes systems thinking as "the ability to see the world as a complex system, in which we understand that 'you can't do just one thing' and that 'everything is connected to everything else.'" One of the most prolific pair of researchers on systems thinking explains systems thinking as the ability to see the whole system while simultaneously thinking about each of its components (Shaked & Schechter, 2014). Monolithic institutions like public schools are slow to embrace change that disrupts the equilibrium.

Yet, a lack of agility should not be an excuse to avoid holistic approaches to school leadership.

As is constantly highlighted by the evening news, political rhetoric, and academic journals, people are afforded different opportunities based on their gender, race, ethnicity, dominant language, and income levels. Often attributes that should be considered strengths in a diverse society are seen as problems to solve. As a reflection of society, schools are not immune to the deficit framing approach to diversity (Noguera, 2008). There is no evidence that the pervasive gaps in academic outcomes for historically marginalized students can be attributed to a lack of effort by educators (Noguera, 2012). Therefore, arming school leaders with the same tools they have been equipped with for the last several decades and telling them to work harder cannot be the solution. It is time to reinvent the tools that school leaders use to improve learning experiences for their students. It is not good enough to do "what is best for kids." Principals must be taught and expected to see the forest as they attend to each and every tree. Systems thinking holds promise as the construct for this kind of work.

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Appendix A

IRB Approval

RE: IRB application – The Relationship Between Systems Thinking by Building Leaders and Academic Outcomes for Marginalized Student Population

Denton, David <dentod@spu.edu>
Thu 12/22/2022 10:51 AM
To: Dunham, Ob <dunhao@spu.edu>
Cc: Denton, David <dentod@spu.edu>

Dear OB,

Your research project "The Relationship Between Systems Thinking by Building Leaders and Academic Outcomes for Marginalized Student Population" has been approved under expedited IRB review process.

This study meets criteria for expedited review, according to one or more research categories (https://www.hhs.gov/ohrp/regulations-and-policy/guidance/categories-of-research-expedited-review-procedure-1998/index.html)

Your study has been assigned IRB tracking number 222306007

As part of your IRB approval, you are required to use this number on any information regarding this study. To complete your documents, add your IRB # to any of your study's informed consent, debriefing and written recruitment material.

Please contact me when you have completed collecting data for your study so that I can close your file.

If you plan to undertake changes in the protocol, you are required to submit a memo to me outlining the proposed changes. You may not change any protocol until you receive permission from the IRB.

As part of its review and oversight charter, members of the SPU IRB may request to inspect the data collection process and the confidential records from this research project.

If a subject experiences any adverse effect as part of this research protocol, you must contact the chair of the IRB at IRB@spu.edu immediately, detailing the adverse effect and the action that you took as the principal investigator. Failure to report an adverse effect within 24 hours may lead to the suspension of this study.

By collecting data under this IRB application, you agree to be in compliance with Federal and SPU policies regarding the conduct of research with human subjects. Failure to comply with requirements associated with this study must be reported immediately to the Chair of the Institutional Review Board. Failure to comply with IRB policies may lead to adverse consequences as noted in the SPU IRB policies.

This is the only (email) documentation that you will receive regarding your study's approval. Please save it for your records.

Please use your study number in any further communication regarding this study.

All the best as you complete your research study!

David W. Denton
Seattle Pacific University
3307 3rd Ave. West
Seattle, WA 98119-1997
206.281.2504
dentod@spu.edu

Appendix B

Email of Introduction to Principals

Research Request

Dunham, Ob <dunhao@spu.edu>
Sun 1/8/2023 12:47 PM

Cc: Dunham, Ob <dunhao@spu.edu>

Bcc: Auyana_lee@msd25.org <Auyana_lee@msd25.org>;marian_gonzales@msvl.k12.wa.us
<marian_gonzales@msvl.k12.wa.us>;Alene_Arakawa@msvl.k12.wa.us
<Alene_Arakawa@msvl.k12.wa.us>;russ_wilterman@msd25.org
<russ_wilterman@msd25.org>;Jeff_Ingrum@msvl.k12.wa.us
<Jeff_Ingrum@msvl.k12.wa.us>;nathan_plummer@msd25.org
<nathan_plummer@msd25.org>;emily_whitten@msvl.k12.wa.us
<emily_whitten@msvl.k12.wa.us>;richard_middaugh@msvl.k12.wa.us
<richard_middaugh@msvl.k12.wa.us>;katy_rudolph@msvl.k12.wa.us
<katy_rudolph@msvl.k12.wa.us>;richard_zimmerman@msd25.org
<richard_zimmerman@msd25.org>;mary_ingraham@msd25.org
<mary_ingraham@msd25.org>;peter_apple@msvl.k12.wa.us
<peter_apple@msvl.k12.wa.us>;mica_harasek@msd25.org
<mica_harasek@msd25.org>;Sarah_Boerner@msvl.k12.wa.us
<Sarah_Boerner@msvl.k12.wa.us>;brian_tinsley@msd25.org
<brian_tinsley@msd25.org>;Kelly_Sheward@msd25.org
<Kelly_Sheward@msd25.org>;keri_lindsay@msd25.org
<keri_lindsay@msd25.org>;jon.wollmuth@mercerislandschools.org
<jon.wollmuth@mercerislandschools.org>;Aaron.Miller@mercerislandschools.org
<Aaron.Miller@mercerislandschools.org>;MaryJo.Budzius@mercerislandschools.org
<MaryJo.Budzius@mercerislandschools.org>

Hi,
My name is Obadiah Dunham. I am a doctoral candidate at Seattle Pacific University. For my
doctoral research, I am studying how systems thinking by building leaders impacts the
academic achievement of students that are typically marginalized. I am requesting that you
support this work by completing this short survey. It should only take about 15-20 minutes of
your time. I will be closing the survey January 31st. I am hopeful that you can support my
research by being one of my necessary 30 respondents. You can find a link to the survey here.

If you have questions about the survey, please feel free to email me or call me at 253.350.9836.

Thank you in advance for your support,
OB

Appendix C

Letter of Informed Consent

Engaging the culture, changing the world®

Seattle Pacific
U N I V E R S I T Y
Informed Consent

The Relationship Between Systems Thinking by Building Leaders and Academic
Outcomes for Marginalized Student Population

Investigators:
Principal Investigator
Name: Obadiah Dunham   Email: dunhao@spu.edu   Phone: 253.350.9836

Co-Investigator
Name: Dr. Julie Antilla   Email: antillaj@spu.edu   Phone: 206.2216
Purpose

This investigation aims to identify the relationship between systems thinking by building
leaders and narrowing outcome gaps for marginalized students. By analyzing systems
thinking, the study intends to parse out the relationship between a leader's ability to see
the system as a whole and student academic achievement. The intent is to determine if
holistic leadership approaches show more promise in promoting systemic reform than
reductionist methods. Knowing how systems thinking impacts student outcomes could
impact principal development, recruitment, and supervision. How common is systems
thinking with current building leaders? Does systems leadership intersect with leadership
for equitable outcomes? Can a holistic approach to school leadership create educational
benefits for marginalized student populations?

Principals of urban and suburban K-12 public schools along the I-5 corridor from
Olympia to Marysville will be invited to participate. You were identified as a principal of
one of these schools, and therefore you are invited to participate. To complete the study a
minimum of 30 respondents will be needed.

Procedures

Participation includes completing an estimated 15 to 20-minute online survey, which
comprises demographic questions and the Principal Systems Thinking Scale (PTSTS).
The PSTS is a 17-item assessment requiring Likert-type responses (Never to Always) of
your systems thinking practices as they pertain to school leadership. The survey
participation window will be open from January 10th to January 31st, 2023.

After the survey window closes, response will be collected and paired with SBA scores in ELA and math for each principal's schools. Responses will then be de-identified, and any identifiable information will be deleted.

Benefits

No direct benefits to participants is anticipated, but your participation has the potential to benefit the body of educational research in the area of principal leadership for students in marginalized communities.

Risks

Participation in the study is considered minimal risk; however, if you experience discomfort with a question, you may skip it. You may also pause the survey at any time and return to it at a later time or stop taking the survey all together.

Participation

Participation is voluntary. You may ask questions about anything that is not clear by contacting the researcher at dunhao@spu.edu or 253.350.9836. When all your questions have been answered, you can decide if you want to participate in the study. This process is called "informed consent."

Confidentiality

The information in the study records will be kept confidential. Data will be stored securely and will be made available only to persons conducting the study, unless you specifically give permission in writing to do otherwise. No reference will be made in oral or written reports that could link you to the study. Your de-identified data may be used in future research, presentations or for teaching purposes by the Principal Investigator listed above.

Subject Rights

If you have questions at any time about the study or the procedures, (or you experience adverse effects as a result of participating in this study,) you may contact the Principal Investigator, Obadiah Dunham at dunhao@spu.edu and 253.350.9836. If you have questions about your rights as a participant, contact the SPU Institutional Review Board Chair at 206-281-2201 or IRB@SPU.edu.

CONSENT

Your signature on this form indicates that you have understood to your satisfaction the information regarding participation in this research project and agree to participate in this study. In no way does this waive your legal rights nor release the investigators, sponsors, or involved institutions from their legal and professional responsibilities.

 I have read the above information and agree to participate in this study. I have received a copy of this form.

*Participants will indicate consent by electronic signature prior to starting the survey. After providing their electronic signature they will proceed to the actual survey. A copy of the consent form will be accessible by navigating to a URL.

Appendix D

First Survey Reminder

Fw: Research Request

Dunham, Ob <dunhao@spu.edu>
Sat 1/14/2023 9:16 AM
Bcc: acouch@auburn.wednet.edu <acouch@auburn.wednet.edu>;agayman@auburn.wednet.edu
<agayman@auburn.wednet.edu>;cbarlow@auburn.wednet.edu
<cbarlow@auburn.wednet.edu>;dstmary@auburn.wednet.edu
<dstmary@auburn.wednet.edu>;ebutler@auburn.wednet.edu
<ebutler@auburn.wednet.edu>;edaniel@auburn.wednet.edu
<edaniel@auburn.wednet.edu>;eherda@auburn.wednet.edu
<eherda@auburn.wednet.edu>;gbrown@auburn.wednet.edu
<gbrown@auburn.wednet.edu>;gwilliams@auburn.wednet.edu
<gwilliams@auburn.wednet.edu>;jdavidson@auburn.wednet.edu
<jdavidson@auburn.wednet.edu>;jgardner@auburn.wednet.edu
<jgardner@auburn.wednet.edu>;jmaier@auburn.wednet.edu
<jmaier@auburn.wednet.edu>;jmckeehan@auburn.wednet.edu
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<kmaloney@auburn.wednet.edu>;lguenther@auburn.wednet.edu
<lguenther@auburn.wednet.edu>;lholloman@auburn.wednet.edu
<lholloman@auburn.wednet.edu>;mrobinson@auburn.wednet.edu
<mrobinson@auburn.wednet.edu>;mweibel@auburn.wednet.edu
<mweibel@auburn.wednet.edu>;mzeigler@auburn.wednet.edu <mzeigler@auburn.wednet.edu>

Hi,
Happy three day weekend.   I am following up on an earlier request to participate in a research
study. The average response time for participants so far has been about 15 minutes. I would
appreciate you taking a few minutes this weekend to add your expertise to my research by
completing the survey at this link.

Thanks for the consideration,
OB

From: Dunham, Ob
Sent: Sunday, January 8, 2023 12:49 PM
Cc: Dunham, Ob <dunhao@spu.edu>
Subject: Research Request

Hi,
My name is Obadiah Dunham. I am a doctoral candidate at Seattle Pacific University. For my
doctoral research, I am studying how systems thinking by building leaders impacts the
academic achievement of students that are typically marginalized. I am requesting that you
support this work by completing this short survey. It should only take about 15-20 minutes of
your time. I will be closing the survey January 31st. I am hopeful that you can support my
research by being one of my necessary 30 respondents. You can find a link to the survey here.

If you have questions about the survey, please feel free to email me or call me at 253.350.9836.

Thank you in advance for your support,
OB

Appendix E

Second Survey Reminder

Fw: Research Request

Dunham, Ob <dunhao@spu.edu>
Sat 1/28/2023 6:45 AM

Bcc: acouch@auburn.wednet.edu <acouch@auburn.wednet.edu>;agayman@auburn.wednet.edu
<agayman@auburn.wednet.edu>;cbarlow@auburn.wednet.edu
<cbarlow@auburn.wednet.edu>;dstmary@auburn.wednet.edu
<dstmary@auburn.wednet.edu>;ebutler@auburn.wednet.edu
<ebutler@auburn.wednet.edu>;edaniel@auburn.wednet.edu
<edaniel@auburn.wednet.edu>;eherda@auburn.wednet.edu
<eherda@auburn.wednet.edu>;gbrown@auburn.wednet.edu
<gbrown@auburn.wednet.edu>;gwilliams@auburn.wednet.edu
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<lguenther@auburn.wednet.edu>;lholloman@auburn.wednet.edu
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<scolburn@auburn.wednet.edu>;therren@auburn.wednet.edu
<therren@auburn.wednet.edu>;tvu@auburn.wednet.edu <tvu@auburn.wednet.edu>

A friendly reminder that this survey will close on January 31st. Only a few days left if you are
interested in participating.
Thanks,
OB

From: Dunham, Ob <dunhao@spu.edu>
Sent: Saturday, January 14, 2023 9:19 AM
Subject: Fw: Research Request

Hi,
Happy three day weekend.   I am following up on an earlier request to participate in a research
study. The average response time for participants so far has been about 15 minutes. I would
appreciate you taking a few minutes this weekend to add your expertise to my research by
completing the survey at this link.

Thanks for the consideration,
OB

From: Dunham, Ob
Sent: Sunday, January 8, 2023 12:49 PM
Cc: Dunham, Ob <dunhao@spu.edu>
Subject: Research Request

Hi,
My name is Obadiah Dunham. I am a doctoral candidate at Seattle Pacific University. For my
doctoral research, I am studying how systems thinking by building leaders impacts the
academic achievement of students that are typically marginalized. I am requesting that you
support this work by completing this short survey. It should only take about 15-20 minutes of
your time. I will be closing the survey January 31st. I am hopeful that you can support my
research by being one of my necessary 30 respondents. You can find a link to the survey here.

Appendix F

Permission to use PSTS Survey

Re: Principal Systems Thinking Scale

Chen Schechter <Chen.Schechter@biu.ac.il>
Sun 10/2/2022 9:16 PM
To: Dunham, Ob <dunhao@spu.edu>
Hi
The measure is attached.
The reference is below.

Shaked, H., Benoliel, P., Nadav N.*, & **Schechter, C.** (2018). Principals' systems thinking: The meaning and measure of a leadership construct. In H. Shaked, **C. Schechter** & A. Daly (Eds). *Leading holistically: How schools, districts, and states improve systemically.* New York: Routledge.

Best wishes,
Chen
_____

Chen Schechter, Ph.D.
Professor
Leadership, Organizational Development and Policy in Education
Head, *MOFET National Institute for Research and Development in Education*
Editor-in-Chief, *Journal of Educational Administration*
School of Education,
Bar-Ilan University, Israel
Email: chen.schechter@biu.ac.il
Website: chenschechter.com
CV

Recent Books:
Walking into school administrative roles: A Journey of change and development. (2022). MOFET Press.

The collective wisdom of practice: Leading our professional learning from success. (2019). A joint publication of Corwin with Learning Forward. *Forewords by Ellie Drago-Severson and Stephanie Hirsh.*

Leading holistically: How schools, districts, and states improve systemically. (2018). Routledge Press. *Foreword by Michael Fullan.* (Coedited with Haim Shaked and Alan Daly).

Self-regulated learning: Conceptualization, contribution, and empirically based models for teaching and learning. (2017). Yearbook of the NSSE (National Society for the Study of Education), Teachers College (TC), Columbia University.(Coedited with Tova Michalsky).

Systems thinking for school leaders: Holistic leadership for excellence in schools. (2017). Springer Press. *Foreword by Michael Fullan.* (Cowritten with Haim Shaked).

Let us lead! School principals at the forefront of reforms. (2015). Ramot: Tel-Aviv University Press..

In our infinite ignorance, we are all equal (Popper).

Doubt is not a pleasant condition, but certainty is absurd (Voltaire).

RE: Principal Systems Thinking Scale

pascalebenoliel@gmail.com <pascalebenoliel@gmail.com>
Mon 10/10/2022 9:29 AM

To: Dunham, Ob <dunhao@spu.edu>;'Haim Shaked' <haim.shaked@hemdat.ac.il>

Dear Dr Shaked, Sure, my pleasure
Dear Obadiah Dunham, please find enclosed the principal system thinking questionnaire.
Good luck with your research!
Pascale

Faculty of Education
Bar-Ilan University

Winner!
Outstanding Reviewer 2020

Pascale Benoliel, PhD
Senior Lecturer, Faculty member
Leadership, Organizational development and Policy
biu.ac.il
https://scholar.google.com/citations?user=ir2eSuMAAAAJ&hl=en
 https://education.biu.ac.il/en/node/5707
https://pascalebenoliel.wixsite.com/pascalebenoliel

From: Haim Shaked <haim.shaked@hemdat.ac.il>
Sent: Monday, October 10, 2022 7:07 PM
To: Dunham, Ob <dunhao@spu.edu>; pascale benoliel <pascalebenoliel@gmail.com>
Subject: Re: Principal Systems Thinking Scale

Dear Dr. Benoliel,
Please see the email below.
Can you help Obadiah?

בתאריך יום א׳, 2 באוק׳ 2022 ב-4:10 מאת <dunhao@spu.edu> Dunham, Ob

> Dr. Shaked,
> I am a doctoral student at Seattle Pacific University in the United States. As part of my
> research for my dissertation, I came across an article by you titled *Principals Systems
> Thinking: The Meaning and Measure of a Leadership Construct.* I am looking for a survey
> instrument that I could use with school leaders to assess their level of systems thinking.
> Would you allow me to use your Principal Systems Thinking Scale for my dissertation? If so,
> do you know where I could find a copy?
>
> Thanks,
> Obadiah Dunham
>
>
> --
> --

Appendix G

Certificate of Completion of Protection of Human Rights Training

CERTIFICATE

OF COMPLETION

PHRP Online Training, Inc. certifies that

Obadiah Dunham

has successfully completed the web-based course "Protecting Human Research Participants Online Training."

Date Completed: **2022-04-23**   Certification Number: **2978885**

PHRP
Protecting Human
Research Participants
Online Training

Appendix H

Principal Systems Thinking Survey

Leadership Attributes					
	Never	Seldom	Some of the Time	Most of the Time	Always
I spot small events that are nevertheless meaningful	1	2	3	4	5
I tend to take unexpected occurrences into account	1	2	3	4	5
I explain decision-making processes in accordance with the school's goals	1	2	3	4	5
I tend to take different points of view into consideration when deciding on various matters	1	2	3	4	5
I tend to involve teachers in decision-making processes	1	2	3	4	5
The decisions I make are based on the school's policy	1	2	3	4	5
I usually try to figure out how various events have led to each other	1	2	3	4	5
I engage in dialogue with those holding educational outlooks that differ from my own	1	2	3	4	5
I tend to suggest solutions that affect the entire work environment, rather than just specific details	1	2	3	4	5
I attempt to identify repetitive patterns in the information at hand	1	2	3	4	5
At meetings and discussions, I try to present most points of view	1	2	3	4	5
I function well in ambiguous situations	1	2	3	4	5
During decision-making, I tend to view the entire picture before examining its details	1	2	3	4	5
I take into account that the effects of a certain action may vary in different situations	1	2	3	4	5
I act with the understanding that small changes can bring about significant results	1	2	3	4	5
I try to understand how certain components of the school affect the way other components in it function	1	2	3	4	5
When making decisions I am aware that my assumptions may be incorrect	1	2	3	4	5

Demographic Data					
Gender	Female	Male	X	Prefer Not to Say	
Number of Years as a Principal	0 to 3	4 to 7	8 to 11	12 to 15	16+
Number of Years as a Principal in Current Building	0 to 3	4 to 7	9 to 11	12 to 15	16+

Open Ended Questions
1. Please describe a time in your principalship you were faced with uncertainty or ambiguity. What determined your next steps?
2. What factors influence your development of a shared vision?
3. When faced with a big decision related to your school leadership, how do you seek out multiple points of view?
4. When faced with multiple issues and seemingly competing interests, how do you prioritize your efforts?
5. What role does systems thinking play in your leadership philosophy?

Appendix I

Coded Responses to Open-Ended Questions for Sample

	Please describe a time in your principalship you were faced with uncertainty or ambiguity. What determined your next steps?		
Respon dent #	**School as One Large System**	**Tolerate Ambiguity and Uncertainty**	**Creates a Single Vision**
2	"Because people at various levels of the organization are affected, I have tried to bring their perspectives and voices to the decision-making process"		
7		"Knowing all would be good again soon"	"Kept buy in my building"
9		"My first steps were determined by my need to understand to the best of my ability"	"I prepared my staff so that they could also be ready"
10	"Can lead to tracking of marginalized systems"	"Caveat that we had a plan B"	"Showed the numbers to teachers" "I wanted their input"
12		"I then work toward a workable outcome"	
13		"Research based information supporting the move" "Connecting the known to the new for the staff"	"The move to create vision and see who wanted to stay on the new"
14			"Talking through the situation with others usually the Building Leadership Team"
21	"Seek more details and drill down to street-level data"		"I don't have all the answers to everything so get input from others"

	"Identify the potential reach of decisions I make"		
22			"It entailed many team meetings"
23	"My next steps are usually determined based on stakeholder feedback and school improvement plan, with guidelines provided by vision/mission, district strategic plan, employee contracts, school board policies"		
26			"I spoke with the teachers who were at first reluctant"
27	"Balancing social and emotional needs and academic/PD need"		
28		"Leaned on district level curriculum specialists and peers for support"	
29			"My next steps were based on trying to what was best for students and staff"
33			"We talked to a variety of stakeholders and ended up participating with both groups in a restorative meeting"
34			"To assign them was the SEL needs of our specific student population"

37	"Make peace with the idea that our MTSS would most likely not be the same as any other in our district"	"If I understand I can deal with the how"	"Laws and policies often dictate we do something"
38	"I asked questions of those who would know more than me"		
43	"Focusing on clear and frequent communication with our community" "How we message to our community"	"We wanted to be proactive as possible" "Our building leadership team met to determine which steps were possible"	"Focused on outcomes were best for students"
44		"Get more information"	
47	"I start with admin team and then building team and if I have time my colleagues"		
52			"Gathered a team and began planning"
53			"I brought stakeholders together and relied on their collective intelligence
55			"I make decisions based on student needs"
57		"Making sure the implementation was smooth and did not harm student learning"	
59			"Think about a situation and collaborate with others when developing a plan"

61	"Focus on providing the community, starting with the Elders, the research that stated it could cause harm" "Working ahead of the community narrative we were able to steer the work and include students ultimately protecting the tribe"		
63	"Continued to study research, monitor student progress, and make adjustments in our practices"		"Seeking information about the different approaches to reading instruction tapping into various district partners"
64			"Evaluated many viewpoints and the needs of the students before making decisions"
66		"Having to 'fit' students into programming based on CBA language that might conflict with student needs"	"We bring along the sped team and gen ed teachers to develop a plan that will work for the student"
67	"Provide support for the teachers, modified systems of management, partnership with outside organizations, and development of core staff"		"Talking/interviewing staff about the school prior to taking over"
70		"Focusing on what I could control" "Over communicated to increase transparency and ultimately build trust"	"Encouraging and willing to roll up my sleeves to help" "I focused on the small wins and celebrated with staff"

71		"Am I acting with integrity?" "Am I maintaining a positive/growth mindset stance"	
72			"Try to meet with my union representatives monthly if not every two weeks to ensure that I am able to hear issues"
80	"Teacher experience, team dynamics, strengths teacher would bring as well as areas of growth"		"Overall it came down to what was best for students"
81		"We examined all the information that we didn't know, and made our best efforts to use the information to guide"	"This was done with the team approach"
82			"I talked with staff"
83	"Working in partnership with my team and KPD"		
89		"Investigating what happened and bring in bystanders to get their perspectives"	

What factors influence your development of a shared vision?			
Respondent #	**Understand the Big Picture**	**Learn and Listen to Others**	**Involve Teachers in Decision Making**
1	"What's best for students"		
2	"I look to see who is most affected"	"I lean on my experience and relationships with my colleagues"	

7	"Keeping integrity and postivity at the forefront"	"Relationships I have built"	
9			"Understanding what the staff value by asking them"
10	"Consideration where we have been with our annual action plan work and what are logical next steps"		"Input from our Instructional Planning Team (teacher leaders)"
11		"Trying to connect with, listen to and empower all that are involved and connected to school"	
12	"How will it be monitored (if we don't have the capacity to monitor, then we don't do it)"		"Teacher leaders and analyze student achievement"
13	"What is necessary to provide access for students to be seen"		"Asking staff what we would want for our own children" "Digging deep with staff, listening with open ears and heart" "Value their insight and that you see their hard work"
14		"Working with a group like BLT that is representative of our community of staff and parents"	
17	"Represent the goals various stakeholders, stay at the center of decision making"		

20		"Need to be transparent to bring others on board to share the work"	
21	"Student voice, student natural/human nature patterns of behavior"	"Activate the why, involve stakeholders"	
22		"Ensuring that all stakeholders have a voice in the vision"	
23		"Including the voices fo students and families, especially the parts of the community who don't speak up"	
26			"Staff personalities and strengths"
27	"Revisit our mission, vision, and goals"		
28		"My core values and the values of my staff, students, and community"	
29		"Student and staff voice…incorporating community voice/input"	
33	"How we are going to best prepare students for life outside of high school"		
34		"Deep respect for my building colleagues"	
37		"Includes determining participants, communication plan and timeline"	
38			"I want to ensure our team is heard"
42			"Discussion about individual and shared values of building staff"

43	"Research, staff input, goals"		
44		"Stakeholder voice and also who is committed to action steps"	
47		"Experience and research"	
52	"Delving into base beliefs and desired outcomes"		
53		"Data is the number one influence"	
55		"Climate, Culture, staff, students"	
57			"Student outcomes, colleague input"
59			"Our beliefs as a school"
60		"I do my best to have committees that have all the players"	
61	"District vision, we try to align		
62	"Building leadership team input, focus on district initiatives"		
63	"Student achievement as well as district vision have significant influence"		
64			"The teacher's CBA can create limitations"
66	"Who is on the team, what our present reality is, where we would like to move"		
67			"Include staff so they have a developed ownership of students"

70		"Listening to various stakeholders and then building upon data and feedback"	
71		"Do I have time to thoughtfully communicate the shared vision?"	"Do the staff have the capacity to take on the vision?"
72		"Collaboration, input, data analysis and student success"	
80	"Looking at academic data as well as social/emotional data along with behavior data"	"Input from all staff, not just teachers, student and families"	
81	"Aligning with the district goals and value/mission" "Needs of the stakeholders, readiness to benefit, capacity to sustain the work, groundwork done"		
82	"Finances"		
83	"Equity, all stakeholders including students"		
89			"Impact of teachers is what makes a difference"

When faced with big decisions related to your school leadership, how do you seek out multiple points of view?			
Respondents #	Consider Issue Before Acting	Exercise Indirect Influence	Motivate Staff Through Responsibility
1		"Go to grade level facilitators and ask them to share with their teams"	

2	"I have various informal and formal channels of communication"	
7	"I bounce thins off lots of teachers, ask several folks in my position in other buildings, and talk with my boss"	
9	"I talk with my colleagues"	"I typically start with the leadership team then talk with individuals who are leaders among their peers"
10	"I consult with my boss. I then consult with my Dean of Students and our Instructional Coach"	
11	"Reach out to everyone-classified staff, certificated staff, community members, students, colleagues, etc."	
12	"We have a building leadership team made up of teachers, counselors and classified staff. In addition, we solicit input from parents"	"I have an organizational chart I share with my staff"
13	"I consult our assistant principal, my learning improvement officer, our school lead team…our parent advisory and student advisory"	
14	"Again, generally by bringing it to our BLT"	

17	"I work with my leadership team"	
20	"Verbal conversations with people in different jobs"	
21	"Do this will all staff, students, secretaries, SRO, custodians, families"	"Hard to ask parents to do one more things so make it easier by establishing a relationship"
22	"I reach out to teacher leaders and my other administrators on my team and if community input is needed will reach out to my parents"	
23	"Surveys, focus groups, staff meeting conversations, leadership team conversations"	
26	"Discussions with different stakeholders"	
27	"We do lots of perception surveys--staff, student parents surveys" "We also do staff/student/parent interviews"	
		"I am a big fan of face-to-face conversation"
28	"Reach out to my RAS, coach/mentor, peers, leadership team"	
29	"I rely on colleagues…I also rely on our building leadership team"	

33	"I'll ask SDLT, my team, our Student Climate Board"		"I'll just go to the people I need to speak with"
34	"I have identified the people I respect but whose outlook and life experience is very different than mine"		
38		"I go sit with people in their space and present the situation to them"	
42	"Conferring with administrative colleagues in other buildings"		
43	"By talking to different grade levels and types of staff to gain input"		
44	"We have a structure that serves as our Input and Decision Making Model"		
47		"Walk around and talk to people informally"	
52	"Hold discussing groups, solicit anonymous feedback to ensure every voice I heard"		
53	"I do a variety of things-interviews, surveys, small groups and committees"		
55	"Ask feedback from colleagues"		
57	"Connect with respected colleagues to seek their feedback"		

59	"Discuss within the leadership team, get input from the people each person on leadership"	"Present at a staff meeting and then have the staff vote so we can see their input"
60	"I check in with a variety of faculty/staff/students"	
62	"Work with the Building Leadership Team reps from defend grade level teams and colleague groups, work with other principal colleagues"	
63	"The first people I turn to on my staff are the building leadership team" "I consult with key staff not on the building leadership team" "I sometimes reach out to key community members in leadership roles"	
64	"I inquire with different stakeholders, CBA, students, and data results"	
66	"I speak about it with different people on our leadership team individually and also collectively"	
67		"Either live in a meeting, or I find staff individually and ask questions"

70	"I will survey ALL staff if I need to hear from everyone…I also utilize my site leadership team and PTA"	"I will have informal/casual conversations-and seek out conversations with specific staff (influential staff)"	
71	"Check on this often with those I respect around the building" "Run the thinking past people at the district office and principal colleagues"	"Ask people behind the scenes"	
72		"We will first share and gather input from this group"	"We have a decision-making model that we follow"
80	"Sent out principal surveys that are confidential" "I also meet with individual staff members, my leadership team, the union reps, PLC teams, and other teams"		
81	"I seek out perspectives from my core leadership team which includes representation from varied staff roles" "I may reach out to my supervisor or other central office leaders"		
82	"Ask, survey staff"		
83	"Face-to-face conversations with various groups when possible"		
87	"I make a list of all stakeholders and them make a plan to		

	reach out to various groups"
89	"I ask those who are affected the most directly" I don't have all the information I would like to have"

When faced with multiple issues and seemingly competing interests, how do you prioritize your efforts?

Respondents #	Prioritizing Based on Urgency	Prioritizing Based on Importance	Identify Patterns	Balance Internal and External Forces
2		"My team could use a prioritization protocol that would help us with identifying when to shift from urgent/important to not urgent/important"		
7	"Safety"	"Time efficiency"		"Win Win situations"
9	"I try to address the most urgent need while also finding common ground"	"I keep the students at the center"	"The more we know, the more the priorities start to show themselves"	

10			"We develop a 3-year school improvement plan and a one-year annual action plan…This does help us focus our work" "Having an organized system of teams with weekly meeting agendas and links to all pertinent meeting notes"	"I must keep my pulse on the work of each team"
11		"What is best for students"		
12		"What is best for kids"	"What does the data say"	
13	"Urgent matters jump the line everyday"	"Deadlines and due dates often lead prioritization"		
14		"I start by thinking of the needs of the students/families furthest from educational justice"		
17				"I start by thinking about the conversations needed to gain understanding of the issues and the desired outcomes"
20		"Using the impact to the students, especially those in marginalized		

		groups, as the primary lens"	
21	"Triage. Safety first, then lawsuits, then news, and academics"	"What is best for kids?"	
22		"I look what impact it will have with students first"	"How this will affect students and staff before making decisions on competing interests"
23		"Taking care of students' immediate needs, then school improvement plan"	
26		"What is best for students"	
27		"What's in the best interest of students first, and staff, next"	
28			"Look at multiple perspectives including sphere of influence and impact"
29		"Stay student centered"	"I try to anticipate long term effects even if they are unknown"
33		"Whatever has the biggest impact on that (students) is what I prioritize"	
		"I focus on the end goal and what	

		is best for the student"		
34		"What do students need?" "What do staff need"		
37	"Unless there is a safety concern"	"Determining any hard parameters put in place by policy or laws"		"Listening to stakeholders, competing interests" "I have learned through the listening process to all concerned stakeholders"
38		"What is best for kids always wins"		
42		"I take a students-first approach" "I also consider the interests/needs of the teachers"		
43		"What is best for students" "What is best for staff"		"What is sustainable"
44			"Share and discuss our interests and try to help each other find success with our students"	
47		"If it affects students, that is first, safety etc., first, adult comfort or feelings next"		
52		"Best interest of students"	"Align with building goals"	
53		"I go to our values and vision"		

55	"Urgent matters are prioritized first usually issues in the best interest of students and staff"		
59	"Those that impact students directly need to rise to the top"		
60	"How the most vulnerable students are impacted"	"Try to keep in mind our SIP Goals"	
61	"What is best for kids then what is best for staff"		
62	"Supporting ALL students at the forefront"		
63	"Student needs take priority followed by how to support staff"	"Seeking multiple perspectives in these situations, I have often been able to see/reframe the issue differently"	
64	"How will the solution best support continuous improvement"		
66	"Students and their learning/experiences at the center"		
67	"We simplify our goals"		
71			"How will this impact the culture of the school?"

|				
		"What is the impact on student learning"		"How will everyone feel when the interest(s) are met?" "Can we get a win win?"
72		"If the interests don't align with our goals, we table them until the spring"		
72		"Students needs at the top of our list"		
80	"I look at what the issues are if anything can be dealt with quickly"	"Student safety (physical and emotional first)"		
81			"Work with our team to try to zero in on what is most impactful and supportive"	"Most immediate impact for positive change, and sustainability with personnel, budget, and stakeholder buy in"
82		"Students first"		
83		"What is going to be in the best interest for students"		
89				"Student issues, staff issues, District office concerns"

Appendix J

Frequency of Themes for Non-Examples of Systems Thinking

	Lack of Big Picture		No Eye for Details		Lack of Clear Vision	
	Upper Quartile	Lower Quartile	Upper Quartile	Lower Quartile	Upper Quartile	Lower Quartile
Leading the Whole	1	2	1	0	4	1
Variety of Opinions	2	0	0	0	1	2
Multidimensional View	2	3	0	0	0	1
Evaluating Significance	1	0	0	0	2	0
Total	**6**	**5**	**1**	**0**	**7**	**4**

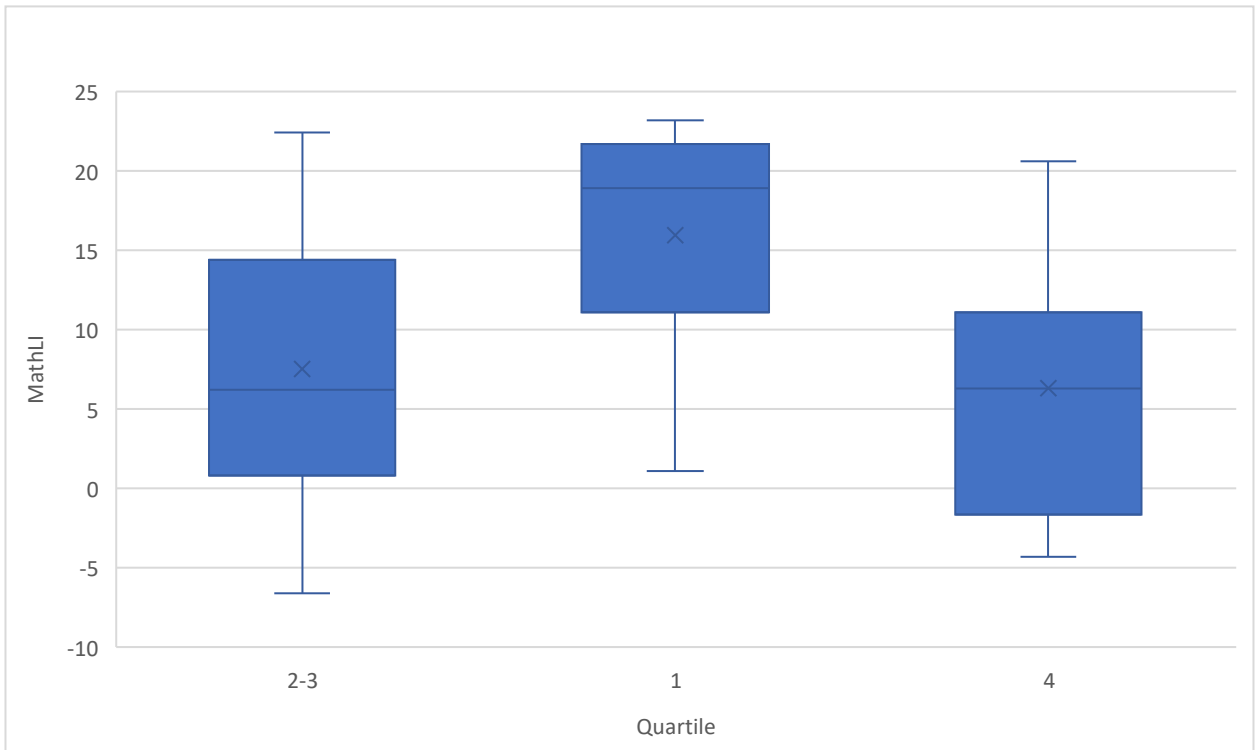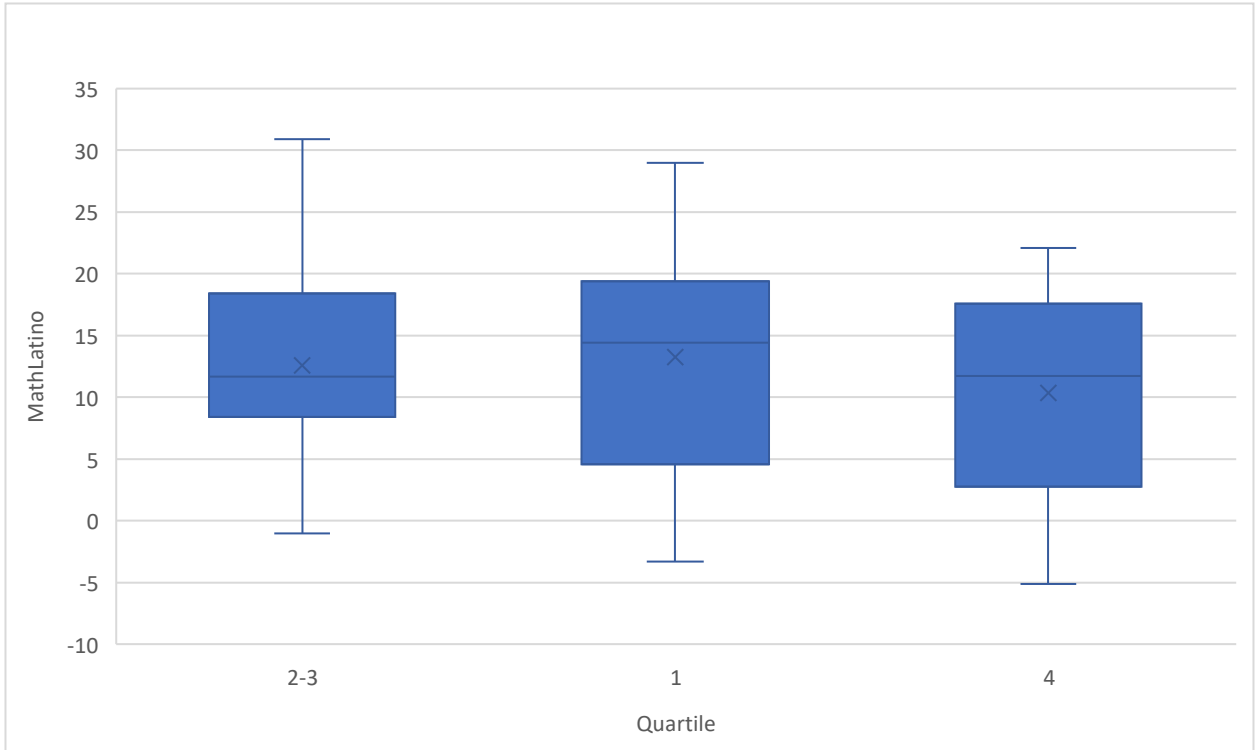**Appendix K**
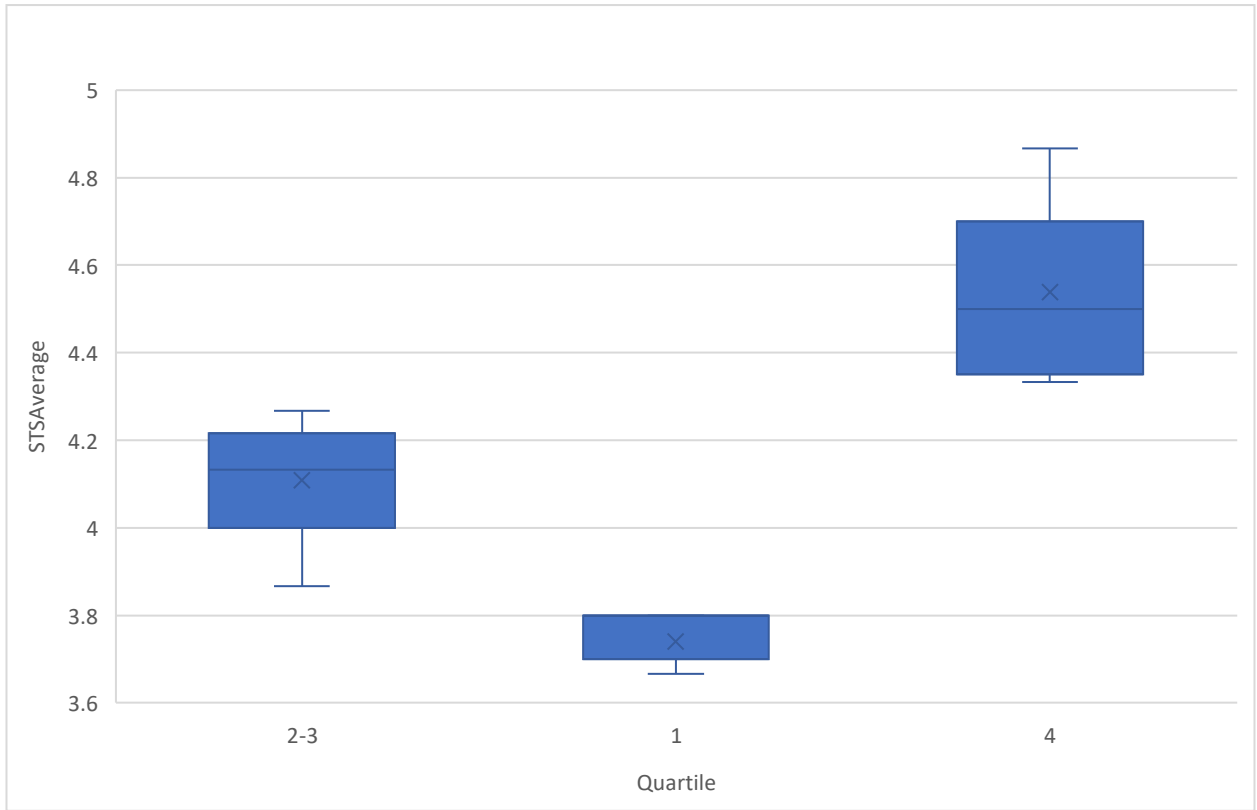
Box Plots for ELA SBA Scores
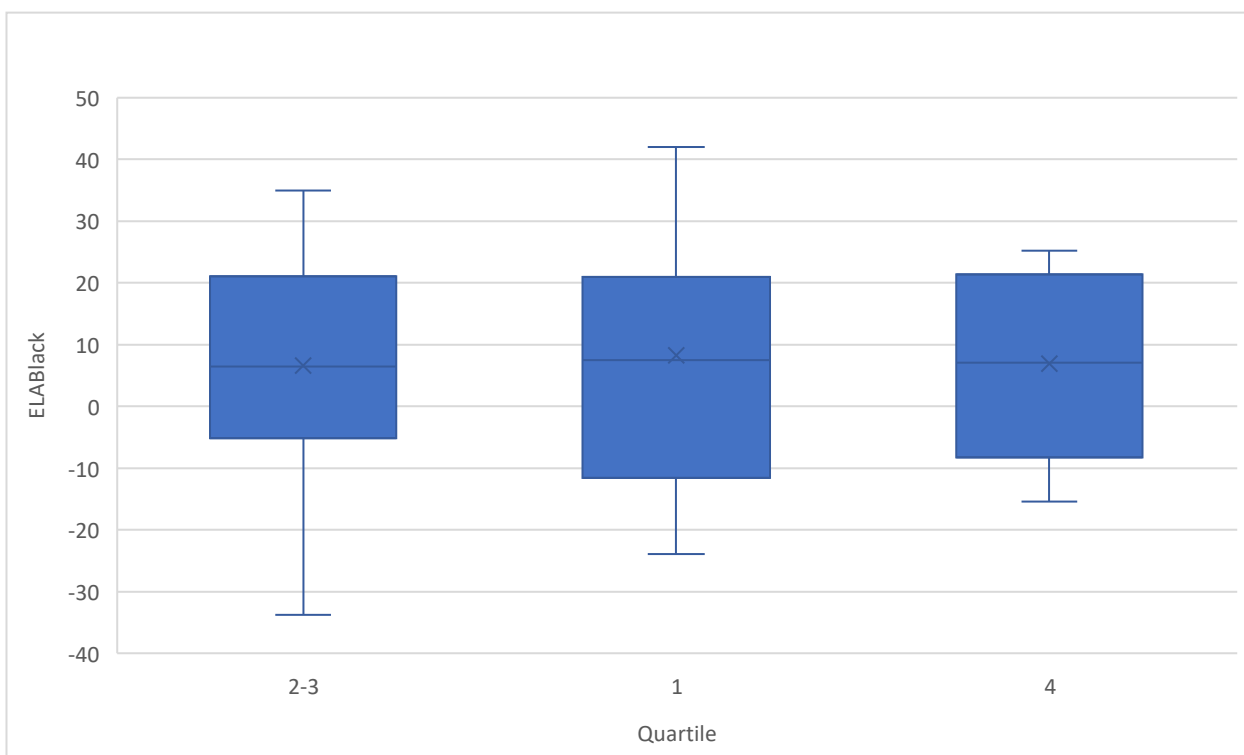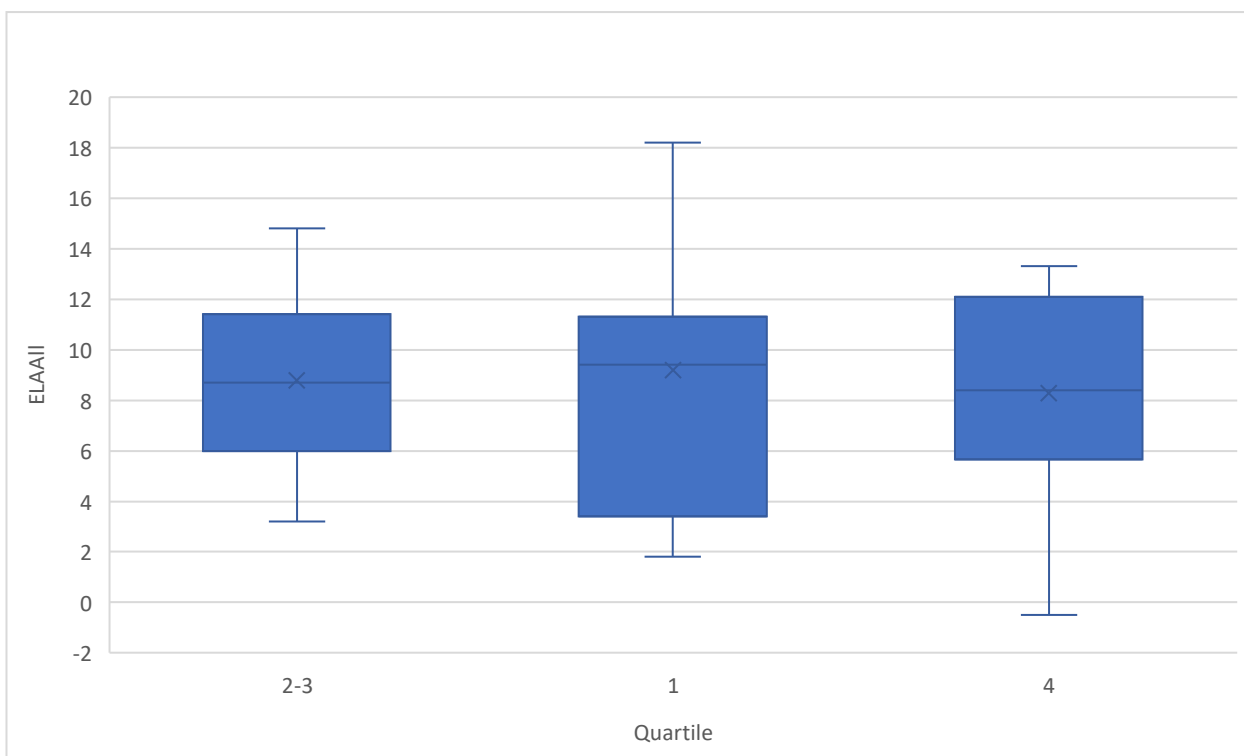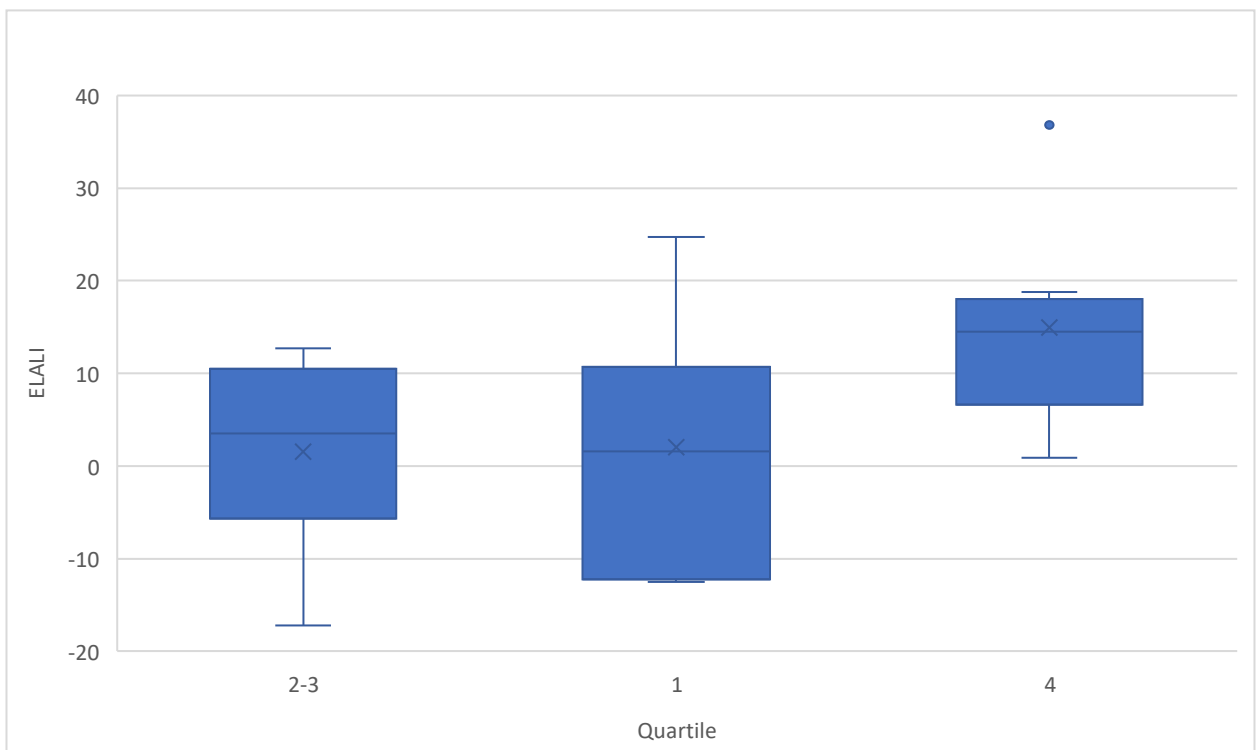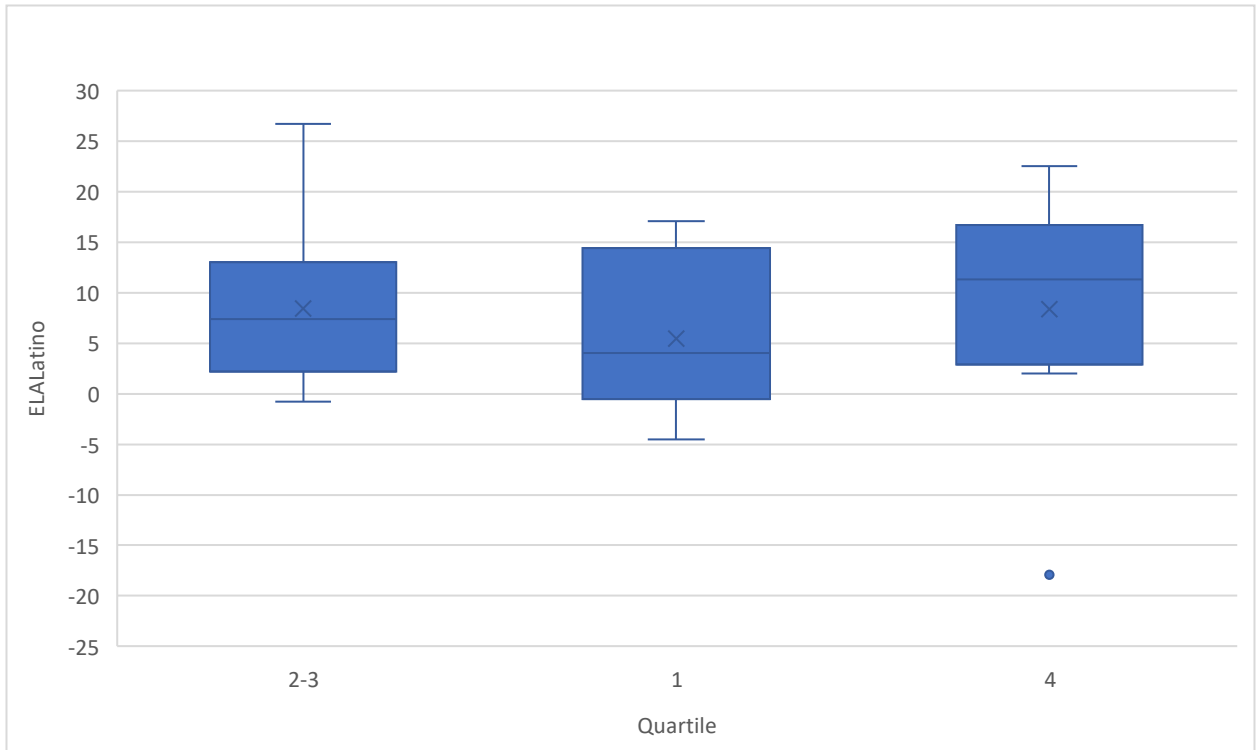
Appendix L

Box Plots for Math SBA Scores
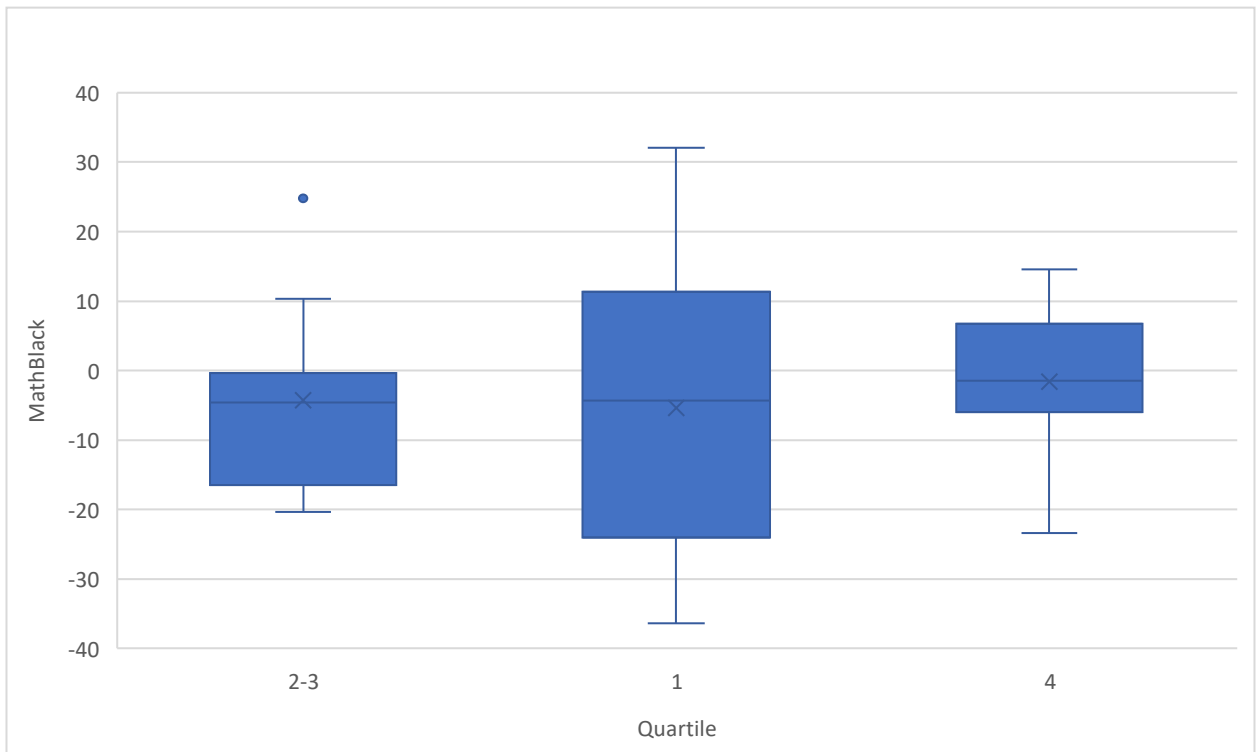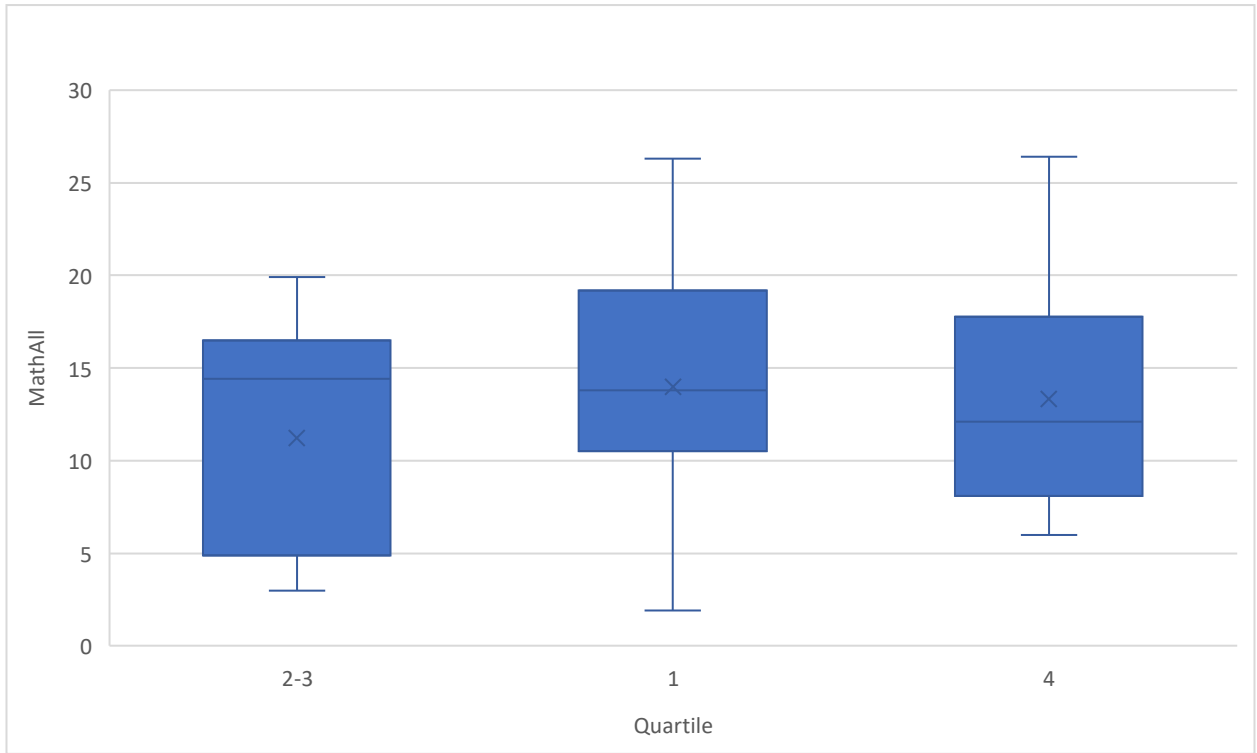
Appendix M

Box Plot of PSTS Responses

Appendix N

Histograms of PSTS Responses

Histogram

for Quartile= 4

Mean = 4.54
Std. Dev. = .185
N = 12