

**A Middle School's Use of Systems Thinking To Make Decisions**

by

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## Abstract

Flair Middle School is a middle school that is located in the suburbs of a major Midwestern city in the United States. It houses grades six through eight, along with more than seven hundred students. Flair Middle School faces the same challenges as any other middle school across the country as it attempts to find ways to better serve its students. In 2011, Flair Middle School began to incorporate systems thinking into its process for making school decisions.

The purpose of this study was to determine how middle school leadership team members at Flair Middle School were using systems thinking to make effective evidence-based decisions pertaining to the school organization. The participants in this study consisted of school administrators and teachers who made up the school's leadership team, as well as other teachers in the school who were using systems thinking in the classroom. The data collected, which included interview data, observational data, and organizational documents, were analyzed and coded. Warrants and assertions were made as a result of the findings contained within the data.

Teachers and administrators at Flair Middle School viewed the tools associated with systems thinking as a successful way to make sense of the enormous amounts of various school data. The majority of participants agreed that systems thinking played a role in the practical application of data for school decision making purposes. Other successes identified by the participants of the study included increased collaboration among school leaders, faculty, and staff. The majority of participants reported that systems thinking created an avenue for more

voices to be heard in the decision making processes of the school. The last major finding of the study dealt with the importance of professional learning. The majority of participants held the opinion that high quality professional learning was critical to the successful use of systems thinking in the school organization.

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## CHAPTER I. NATURE OF THE STUDY

### **Introduction**

In this age of increased accountabilities on school organizations, school leaders have been searching for effective decision-making strategies for continuous school improvement purposes. One of the main goals of a school organization is to make meaningful decisions that will affect the students they serve in a positive way. The decisions that are made within the school have the ability to positively impact student learning. Student learning can have a significant impact on an individual's monetary earnings and future quality of life (Card, 1999; French, Homer, Popovici, & Robins, 2015; Hamermesh & Donald, 2008).

According to a study performed by the National Center for Education Statistics in 2014, the median earnings for full-time year-round working young adults ages 25–34 with a bachelor's degree were \$49,900, while the median was \$25,000 for those without a high school diploma or its equivalent, \$30,000 for those with a high school diploma or its equivalent, and \$35,000 for those with an associate's degree. In other words, young adults with a bachelor's degree earned almost twice as much as those without a high school diploma or its equivalent, and 60 percent more than young adult high school completers. Additionally, in 2014 median earnings for young adults with a master's or higher degree were \$59,100, some 23 percent more than the median for young adults with a bachelor's degree. Knowing that decisions made at the local school level have such an impact on the lives of their students, school leaders are faced with determining the best ways to use data to make important decisions regarding their respective organizations.

For years, school leaders have used accumulated data to assist in making these decisions. Demographic, student learning, perception, and process data have all been utilized to help justify important decisions made by school leaders (Bernhardt, 2004). Professional learning communities and school leadership teams have served as ways of allowing other voices from within the organization to be heard on key decisions regarding the school organization. According to Boudette (2005), the schools that are most successful in improving are those who look at data collaboratively with all members of the organization.

As the influx of new data continues to come in, school leaders, as well as the leadership teams, can struggle with sifting through it all. In order to accurately and logically disseminate the data in a way that is useful to the school organization, a process for synthesizing the data is a must. This case study of a Midwestern middle school leadership team looks at the use of systems thinking as a process by which a school can use evidence and make important decisions regarding the school organization and have positive effects on its stakeholders.

### **The Research Problem**

According to Shen et al. (2012), various types of data have been used to make decisions in school organizations. Over the last fifteen years, schools across the country have had to take a closer look at their organization's data. The accountabilities involving what constitutes student achievement has risen as a direct result of Public Law 107-110, better known as the No Child Left Behind Act of 2001 (Parham, 2015; Park & Datnow, 2009; US Department of Education, 2002). Bernhardt (2004) stated, "The use of data can make an enormous difference in school reform efforts by helping schools see how to improve school processes and student learning" (p. 3). The days of a school leader simply being a manager and the teachers merely imparting

knowledge are a thing of the past. School organizations are now being tasked with moving their organizations forward and showing improvement each year.

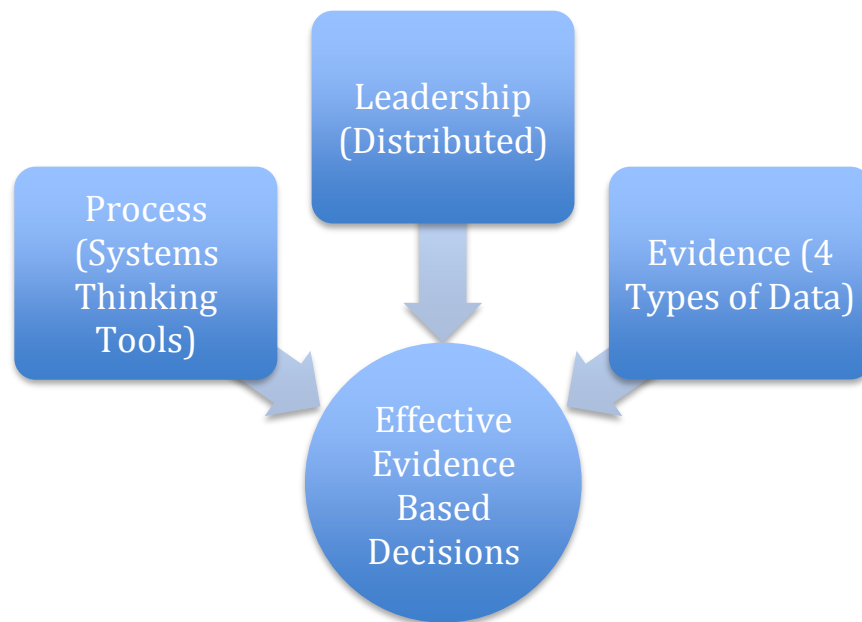
Lezotte and McKee (2002) claimed, “continuous school improvement is a collaborative process” (p. 45). Successful school leaders are beginning to move away from the managerial style of school leadership of years gone by and embracing collaborative, democratic leadership styles within their school organizations (Kohm & Nance, 2007). School leadership teams based on democratic principles provide school administration an avenue to engage multiple stakeholders for a variety of viewpoints before a final decision is made (Kensler et al., 2009).

As school organizations continue to utilize varying sources of data as evidence for decision making purposes and school leaders continue to build collaborative cultures of shared decision making in schools, the question remains as to what processes the school leadership teams will use in disaggregating and interpreting data. Some school organizations are utilizing systems thinking to help facilitate discussions and help guide the evidence-based decision making process for the purpose of school improvement. In its current state, we have very little empirical evidence to show systems thinking as an effective means of facilitating change within a school organization (Kensler et al., 2012). The research problem that will be addressed in this study is: How can systems thinking be used for the purpose of effective evidence-based decision making by a middle school leadership team?

### **Conceptual Framework**

According to Miles and Huberman (1994), “A conceptual framework explains either graphically or in narrative form the main things to be studied and the presumed relationships among them” (p. 18). Bettsworth, Alonzo and Duesberry (2009) wrote of the lack of the use of a systemic approach by school leaders to sort through the amount of evidence/data that is readily

accessible to them. This study examines the perceived components of effective evidence-based decision-making in schools, which includes systems thinking tools, distributed leadership, and evidence (data). Aspects of the model will be discussed in more detail in the following paragraphs. The conceptual framework of this study includes the themes as listed in Figure 1. The figure is a visual representation of what I perceived to be essential characteristics necessary for making effective evidence-based decisions, based upon my synthesis of the literature. This figure is a visual interpretation of the conceptual framework for this study.



*Figure 1. Conceptual Framework*

In order to make effective evidence based decisions, an organization must have the appropriate sources of data. According to Park and Datnow (2009), data should be used as a resource for deep, meaningful conversations revolving around continuous improvement of the school organization. Bernhardt (2004) stated that school data could be broken into four major categories, which include: student learning, demographic, perception, and process. Hargreaves

(1997) wrote that the educational definition of evidence is specific information that verifies effective practices in the school organization. Evidence/data plays a major role in decision-making process because it provides the information necessary to help guide the discussions regarding “root causes or recurring problems” (Bernhardt, 2004, p. 3). Data, as referred to in this study, is any collection of information, visual observations, or audible recordings. Evidence on the other hand, referred to the information, observations, or recordings that have been selected to assist in answering a particular question or supporting a particular claim.

Leadership was a second theme that emerged in the literature as it relates to effective decision-making. With little room for error, school organizations have turned to a more collaborative approach for school leadership and school decision-making. Leithwood and Mascall (2008) stated that democratic leadership organizations could decrease the errors associated with relying solely on one individual. Tschannen-Moran (2001) echoed this statement in an earlier piece of literature by stating that collaboration increased the probability of higher quality decisions in schools. By utilizing others within the organization through more democratic forms of school leadership, a school leader is able to gain important insight from a variety of stakeholders. According to Louis, Murphy, and Smylie (2016), leadership is responsible for creating cultures of caring within the school organization, which may lead to increased trust. “The increased trust can lead organizational members to be more open and willing to tolerate new behaviors or ideas of others” (p. 36).

The final theme pertaining to the conceptual framework of this study is that of the process used by school leadership teams to work together in their quest to make sense of the evidence/data. Senge et al. (2000) defined systems thinking as “the ability to understand the interactions and relationships in complex, dynamic systems” (p. 239). The tools associated with

systems thinking allow for members of the organization to take a unique look at various aspects of the organization and gain a better understanding of the organization's current reality.

### **Purpose Statement**

The purpose of this study was to determine how middle school leadership team members at Flair Middle School were using systems thinking to make effective evidence-based decisions pertaining to the school organization.

### **Research Questions**

1. What successes are attributed to the use of systems thinking in the decision-making processes at Flair Middle School?
  - a. What prerequisites, if any, preceded the use of systems thinking in the decision-making processes at Flair Middle School?
  - b. What facilitates the development of systems thinking use in the decision-making processes at Flair Middle School?
  - c. What barriers inhibit the development of systems thinking use in the decision-making processes at Flair Middle School?
2. How are systems thinking tools used in the evidence-based decision making processes at Flair Middle School?
3. What are the possibilities for future use of systems thinking at Flair Middle School?

### **Significance of the Study**

The purpose of this study was to determine how middle school leadership team members at Flair Middle School were using systems thinking to make effective evidence-based decisions pertaining to the school organization. This study explores schools' organizational use of systems



thinking as a process by which data can be examined holistically. With the increased accountabilities placed on schools, a need for best practices in regards to processes for evidence-based decision making exists.

There is research on the use of data, as well as evidence-based decision making, in schools (Armstrong & Anthes, 2001; Lachat & Smith, 2005; Mandinach, Friedman, & Gummer, 2015; Mandinach & Gummer, 2013). There is also research on the use of systems thinking for organizational learning and improvement that spans over several decades. Senge and Sterman (1992) wrote of the need for change in business and industry because of the growing complexity within the world. They argued that the use of systems thinking would help management adapt more successfully to the changing business environment. Giles and Hargreaves (2006) conducted a case study, which involved three innovative secondary schools located in Canada and the United States. The study looked at the sustainability of the schools as learning organizations. Valentinov, Heilscher, and Pies (2015) conducted research involving nonprofit organizations and the use of systems thinking. The researchers suggested that nonprofit organizations undermine their own effectiveness because they fail to recognize the complex issues surrounding their intended mission.

Over the past few years more empirical research has been completed regarding the use of systems thinking and its tools in schools' continuous improvement process. Kensler et al. (2012) conducted a cross-case analysis of two high school leadership teams use of systems thinking tools for improving practice. Prestridge (2013) conducted a case study of a school system in the United States Midwest on the use of systems thinking for school improvement. Parham (2015) conducted an ethnographic field study that compared school decision making to that of the United States Army. The study focused on the decision-making processes put in place by each

organization for improvement purposes. Shaked and Schechter (2016) conducted three separate qualitative studies that focused on the use of systems thinking by school organizations in Israel.

According to Senge (1990), systems thinking is a discipline that allows organizations to view “patterns clearer, and to help us see how to change them effectively” (p. 7). This study allowed school leaders the ability to look at Flair Middle School’s use of systems thinking and possibly apply it to their own individual school organization. Although Flair Middle School has its own distinct story, several of the implications that emerged are certainly transferable to other school organizations.

### **Delimitations**

The study took place over the course of approximately two years with the initial interview portion of the research taking place in January of 2013. The middle school selected for the study was located in a suburban area of a Midwestern state in the United States. The school was chosen due to the school district’s extensive work involving systems thinking. The school district’s assistant superintendent of curriculum was involved heavily in the scheduling of interviews for the school’s administration and selected teachers. Those who were selected for interviews were presently serving or had previously served on the school continuous improvement team. All respondents had received introductory training and professional development on the use of systems thinking tools. The interview questions were open-ended, which allowed the respondents to carry the conversation in a more natural direction.

### **Assumptions**

There were multiple assumptions associated with this study. The first assumption was that the teachers and instructional leaders interviewed for this study were representative of the

population of organizational members at Flair Middle School which had received training in systems thinking.

The second assumption was that the responses received from participants were honest and accurate and truly reflected their perceptions of the use of systems thinking in the evidence-based decision making process within the school organization. Participants were given assurances of confidentiality to combat against the pressure to give strictly positive answers pertaining to the research questions.

### **Definition of Terms**

**Behavior Over Time Graph (BOTG/BOT)** – A systems thinking tool used to track a pattern of behavior over a specified period of time (Senge, 1994).

**Causal Loop Diagram (CLD)** – A systems thinking tool that represents cause and effect (Senge, 1994).

**Continuous School Improvement Plan (CSIP)** – Ongoing plan for improving different facets of the school organization backed by data and evidence.

**Data** – Any collection of information, observations, or recordings gathered by human researchers or computers.

**Distributed Leadership** – Collaborative form of leadership that encourages participation by all members of the organization (Cloke & Goldsmith, 2002).

**Evidence** – Refers to information, observations, or recordings that have been selected to assist in answering a particular question or supporting a particular claim.

**Evidence-Based Decisions** – The decision made is justified by unique forms of data (Bernhardt, 2004).

**Iceberg Model** – A systems thinking tool used to combine other systems tools in route to identifying the underlying issue/cause (Senge, 1994).

**Ladder of Inference (LOI)** – A systems thinking tool that visually shows the theoretical thought processes as one moves to faulty reasoning (Senge, 1994).

**Perception Data** – Data that pertain to opinions, views, or beliefs (Bernhardt, 2004).

**Student Achievement Data** – Data that measures student proficiency as it relates to taught skills and knowledge (Bernhardt, 2004).

**Systems Thinking** – According to Senge (1990), “systems thinking is a conceptual framework, a body of knowledge and tools that has been developed to make full patterns clearer and to help us see how to change them effectively” (p. 7).

### **Organization of the Study**

This study is grouped into five separate chapters, the bibliography, and appendixes. Chapter one serves as a summary to the entire study. Chapter two serves as a review of the literature associated with the themes of evidence-based decision making, democratic school leadership, and systems thinking. Chapter three describes the qualitative methodology used in this study, as well as the research design, samples, and instruments. Chapter four presents the data analysis and findings of the study. Chapter five contains the summary of the study along with future recommendations pertaining to the findings. The study concludes with a detailed bibliography and appendixes.

### **Summary**

This chapter served as the main introduction to the study. The purpose of this study was to determine how middle school leadership team members used systems thinking to make effective evidence-based decisions in their school organization. Introductory information

regarding the study's research problem, conceptual framework, purpose statement, research questions, significance of the study, delimitations, assumptions, definition of important terms, and organization of the study were included over the course of the chapter.

## CHAPTER II. REVIEW OF LITERATURE

### **Introduction**

Using data from student assessments and examinations to help inform decisions relating to school curriculum and instruction has been commonplace for over 100 years (Shen et al., 2012). In the past decade the education profession has re-evaluated the evidence it uses, how it is used, and how it informs decisions. As a result of sweeping legislation regarding school reform, we are now in an era of data-driven education (Parham, 2015; Park & Datnow, 2009). In 2001 Public Law 107-110 (No Child Left Behind [NCLB]) was passed. NCLB brought about new standards and levels of accountability for education professionals. On December 10, 2015, the replacement for NCLB was signed into law. Although the Every Student Succeeds Act (ESSA) changed some of the former rules put in place by NCLB, it did not change the educational accountabilities required by our country's Department of Education. According to Shen and Cooley (2012), NCLB increased accountability measures for school leaders, mainly principals. Student achievement and the overall school environment are areas that are monitored annually by state departments of education, as well as the federal department of education. As a result, school leaders are required to use evidence more than ever before to assist in making appropriate decisions for the school organization (Parham, 2015; Park & Datnow, 2009). As a result of NCLB, educational professionals have developed strategies to make evidence more user friendly in various levels of the school organization for multiple stake-holding groups. School leaders are beginning to use the strategies, which were developed to look more closely at the

mountains of data and evidence available and sift through to identify information, which will assist them in making decisions to improve achievement levels in multiple areas of the school (Brunner et al., 2005). According to Lasley (2009), school organizations have invested heavily in the use of large amounts of data and evidence to assist in creating a true picture of the organization's performance and to help it move forward. One major positive occurrence, which resulted from legislation such as No Child Left Behind, and more recently ESSA, is that school leaders have started changing their mental models about how decisions are made within the school organization (Brunner et al., 2005). The problem is that there is a lack of a systemic approach by school organizations to look at the abundance of evidence/data that they have at their disposal (Bettesworth, Alonzo, & & Duesbery, 2009). Without a research-based approach, many schools are relying on the skills of a few individuals (or one individual, in some cases) to view data and make sense of it before making their own narrow decision.

This study examines the perceptions associated with school leadership's use of systems thinking tools in the evidence-based decision-making process in the school organization. This review of literature will inform the reader about existing literature pertaining to evidence-based decision making/evidence-based practice, distributed leadership, and the concept of systems thinking, along with specific systems thinking tools that can be used in decision-making processes.

### **Evidence-Based Decision-Making**

Burt and Reeves (2006) described effective decision-making as the ability to acquire understanding and skills related to how to gather, analyze, and interpret data that is important to the organization along with being able to act on the findings. The decisions that educators have to make are sometimes very hard to interpret because of vagueness (Marchant & Paulson, 2009).

“Evidence-based practice is relying on evidence to shape decisions” (Kowalski, 2009a, p. 12). Evidence-based practices are a way of replacing old established ways of doing work with new, more effective ideas and answers. Evidence-based decision-making has already taken hold in many other professions around the world. In business, companies are always trying to find more cost effective ways of producing their good or extending their service to their customers with the expectation of seeing a much higher profit margin. Kowalski (2009b) suggested evidence-based practices had not received the consideration it should in the education profession. Since that time other researchers have echoed a similar belief stating a significant portion of accumulated data is not used in school decision-making processes (DeLisio, 2009; Lange et al., 2012; Parham, 2015). Kensler et al. (2012) stated, “Although school systems have access to more data than ever before, teachers and administrators lack the skills to use the data to enhance student achievement and foster school improvement” (p. 32).

## **Need**

Since the inception of No Child Left Behind, there has been an increased need for school systems and organizations to look at pertinent evidence to assist in developing continuous improvement processes and to determine the successes or failures of schools, teachers, and students (Marchant & Paulson, 2009; Parham, 2015). Evidence-based decision-making in school organizations is the process by which school leaders and stakeholders use multiple sources of evidence to provide a more complete picture of the organization as a whole. This comprehensive picture includes a school’s strengths and weaknesses. Using the collected evidence, the school members work together to develop a plan to prioritize objectives and address the glaring needs (Feldman & Tung, 2001). Luo (2008) described the process as moving from factual information



to action. He also included that evidence based decision-making is “interactive” and “multifaceted” (p. 610).

Using evidence-based decision-making practices applies proven theories to identified recurring problems (Kowalski, 2009). Organizational leaders must be able to process the information and understand what the evidence is saying. Wohlstetter et al. (2008) said that evidence-based decision-making comes about as a result of school organizations taking advantage of the information made available to them at the school level to assist in making improvements in the school’s curriculum which will ultimately impact student learning.

The major push for evidence-based decision-making was a component included in the American Recovery and Reinvestment Act of 2009 (ARRA) and the Race to the Top (RTT), which was sponsored by the United States Department of Education. Both of these placed major emphasis on the belief that using evidence effectively is closely associated with improved student academic achievement (Kennedy & Datnow, 2010). Evidence-based decision-making can provide a way for all organizational stakeholders to become involved and engage them by seeking their input through questions and answers. Both Kennedy and Datnow (2010) and Feldman and Tung (2001) agree that evidence-based decision-making can make serious headway in increasing professional dialogue among various stakeholding groups in the school organization. If done properly, the process can act as a way to provide powerful learning opportunities by allowing those in position to have the most impact on students a way of reflecting on their previous work. These learning experiences may in turn lead to an increase in student learning (Kennedy & Datnow, 2010).

## Studies

Copland, Knapp, and Swinnerton (2009) conducted a case study involving an elementary school located in the Northwestern part of the United States which received Title I funding. The participants in the study included the school principal, as well as past and present members of the school's leadership team. The teachers involved in the study saw significant changes in their organizational culture as a result of their increased capacity for utilizing classroom level data.

One teacher stated:

The entire school team is focused on meeting the specific reading goal for our kids. Grade level teams meet every week with a facilitator, discussing student progress and strategies... We have moved from what I would describe as a closed culture, to a much more open one... Teachers, in contrast to the old model, are doing a significant amount of discussing, examining, speculating, both about students' progress and their own practice. (p. 165)

Heather Zavadsky (2009) conducted a case study, which looked at three school systems' use of data/evidence in the school improvement process. Each school system that participated in the study had been nationally recognized for increased student academic achievement. One group of teachers from the study explained:

Our data drives our instruction and helps us revisit and revise our curriculum. If we see there is an area where our first-graders are not achieving, we rethink it – Is it taught too early? Is it taught too late? How do we adjust our curriculum and/or instruction to make up for that? (p. 179)

By opening dialogue with colleagues and looking at data/evidence through a new lens, school leaders can make more informed decisions, which may lead to increased student achievement.

Park and Datnow (2009) conducted a qualitative case study that consisted of four urban schools within the United States. Their study included schools that had instituted various support structures to enhance teachers' skills in the use of evidence for school improvement purposes. The results suggested that evidence based/ data driven decision-making could potentially bring about increases in student academic achievement. With the increase in accountabilities and the constant push for continuous improvement, school leaders must find ways to make improvements in the school organizations. As they become more comfortable with the many different ways to use evidence/data, they can more effectively identify areas of need. Park and Datnow (2009) made the point that school leaders are not the only ones who stand in need of learning. They suggested that teachers need to be active in the learning how to make evidence based/ data driven decisions in an effort to improve instruction. From prior research it was found that teachers often lacked the training to be able to use the evidence/data properly (Kensler et al., 2012). Even in cases where the school system invested time and money in hopes of building their teachers' capacities for utilizing data, many studies found that teachers did not use data effectively in the planning for their individual classes.

Parham (2015) and Park and Datnow (2009) implied it was critical for the school organization to make evidence/data use an important part of the school system's culture. It was found that if school leadership created guidelines for data use and communicated the expectation across the organization that evidence/data use for decision-making would be more likely to happen. One of the important keys were the explicit expectations. If those expectations are not communicated effectively and not modeled by school leaders, it would be hard to expect others to follow suit.

Parham (2015) conducted an ethnographic field study that compared the decision-making strategies used by U.S. public school leaders with that of a U.S. Army military unit. The participants in the study included school principals within a school district located in the Southeastern United States and selected U.S. Army personnel who met certain criteria specified by the researcher. The findings of the study included the belief that educational leaders may not be using accumulated school data to its maximum potential due to the lack of a decision making model.

Park and Datnow (2009) and Copland, Knapp, and Swinnerton (2009) communicated that utilizing multiple sources of evidence/data was important. Although student academic performance plays a major role because of the nationwide accountabilities that have been put in place as a result of NCLB, other types of school evidence/data are important contributors as well. Types of data such as assessment, instructional practice, and goal implementation were mentioned in the report. The key is that multiple sources can be utilized to help guide the organization through the improvement process. In their study, Park and Datnow (2009) found that educators agreed that looking at multiple sources of evidence/data is important when making decisions in the best interests of the whole organization. In order to create the level of ownership needed for this to become a part of the school's culture, all members within the organization need to be provided with ongoing professional development to support growth. In the study, as the teachers' capacity for evidence/data use in the decision making process was built, so did the instructional knowledge and skills that were on display in the classroom, which ultimately would affect student learning.

## Use

The organizational leaders who are tasked with leading the decision-making process (politicians, school leaders, and teachers) need the best, most accurate evidence/data (Cooper, Sureau, & Coffin, 2009). School leadership must be careful to select the appropriate types of evidence that best suits their needs. In their article pertaining to principal leadership's use of data, Copland, Knapp, and Swinnerton (2009) showed various ways educational leaders used data and the possible decisions that could be influenced by the data. Table 1, created by Copland, Knapp, and Swinnerton (2009), shows examples of specific leadership activities facing school leaders currently and the applicable uses of data in each possible case.

Table 1

*Ways Educational Leaders Use Data*

<i>Type of Leadership Activity (with and for internal or external audiences)</i>	<i>How Data Are Used and What Kinds of Data Are Implied</i>
Diagnosing or clarifying teaching and learning problems (primarily internal to the decision-making group).	Seeking to know whether, or to what extent, student learning matches those overarching expectations (standards) established at the top of the system, leaders seek out information that reflects one measure of student learning in particular content areas.
Weighing alternative courses of action (primarily internal).	Leaders use data to evaluate existing programs or curriculum approaches, and (where they have relevant data) judge their potential in comparison with alternative programs.
Justifying chosen courses of action (primarily external).	Data (e.g., concerning learner characteristics, learning outcomes, comparative program benefits, school closure decisions) are used selectively “to make a compelling case” for programs or courses of action that may or may not have been chosen on the basis of the data.
Complying with external requests for information (external).	Leaders are careful to generate information requested by external agencies, authorities, or groups providing funding—for example, descriptions of how different learner groups are served, evaluations of services to these groups.
Informing daily practice (internal).	Data of various kinds are used by administrators and teachers to guide daily practice. The data are often informal, gathered in mid-stream, and in a form that can be immediately interpreted and used by the practitioner for refining teaching and learning.
Managing meaning, culture, and motivation (internal).	Data help leaders understand and guide the cultural aspects of the professional workplace, by representing to staff what the organization is accomplishing, how people feel about their work, what matters in the work, and what professional learning needs exist.

(Copland, Knapp, & Swinnerton, 2009, p. 157).

According to Bernhardt (2004), many school districts across the United States believe that they are data-driven or evidence-based just by focusing on the school’s standardized achievement test scores. Kowalski (2008) said evidence-based decision-makers are not just looking at test scores but a multitude of influences that can affect student academic performance.

It is essentially important for school leadership to include data from the four major types to gauge a more accurate understanding of their school organization (Bernhardt, 2004). Student learning/achievement, demographic, perception, and school process combined and used properly can give a more accurate representation of where the school is in terms of educational success and what possibly needs to be done to improve. Copland, Knapp, and Swinnerton (2009) described the four major types of school data as “raw materials” (p. 155) that must be used in conjunction with established “concepts, criteria, theories, and interpretive frames of reference in order to be considered useful evidence” (p. 155).

Wohlstetter, Datnow, and Park (2008) made it clear that if a school organization is asked to implement evidence based decision-making policies, then that particular school organization needs to have the autonomy of decision rights at the site. Teachers should have the ability to “identify, develop, and implement an intervention strategy based on their analysis of data” (p. 241). Ongoing professional development in the area of evidence based decision-making is necessary for successful implementation of such policies. In order for any member or stakeholder in the school organization to be able to make the most well informed decisions, those decision-makers must have had professional development specific to the identification and analysis of school data. Targeted professional development for evidence based decision-making is important to building the culture of using data, as well as helping assist with providing some type of structure (Wohlstetter, Datnow, & Park, 2008).

Wohlstetter, Datnow, and Park (2008) set criteria for an effective evidence based decision making plan in school organizations. The first component is cultivating shared objectives. Senge (1990) spoke at length about the importance of building a shared vision. According to him, a shared vision “binds people together around a common identity and sense of destiny”

(p. 9). Shared vision within an organization creates a sense of ownership among the stakeholders.

The second component is building capacity among organizational members. Information on school level needs is important in order to build meaningful professional development opportunities for members and stakeholders. Burt and Reeves (2006) concluded that in order for organizational leaders to make effective decisions using data, knowledge and skills must be acquired. Leaders can also solicit information on strengths and use them to their advantage.

The third component involved creating incentives for evidence use. It is important for school leaders to show how much they value something such as evidence use. The use of incentives helped embed the use of evidence for decision-making purposes into the culture of the school organization.

The next component was mentioned earlier in Wohlstetter, Datnow, and Park (2008) in regards to school site autonomy. If schools are going to go through the processes of using evidence to drive the decision-making processes in the school organization, it is important that they are given the freedom to put their decisions into use. Without a certain level of autonomy, the organizational members might not fully engage in the evidence based process, especially if they feel their voice will not be heard. The last component is similar to the one before in that Wohlstetter, Datnow, and Park (2008) stated that school systems/districts should consider individualizing plans for evidence-based decision-making based on the individual school rather than a system-wide. This goes back to autonomy in the individual school.

With the increasing accountabilities associated with No Child Left Behind, evidence-based practices have become essential to school organizations all across the United States. Evidence-based decision-making addressed the needs for schools that are associated with the



issues of NCLB. Kowalski (2009) expressed that evidence-based decision-making should become the norm for school organizations as information regarding its successes in relation to continuous school improvement and more effective leadership practices. Sustainable change and improvements depend upon the leadership of an organization. By utilizing evidence based practices Kowalski (2009) ventured that school organizational leaders could be more successful in accurately defining problems and collaboratively making important decisions to respond to them in an appropriate fashion.

Heather Zavadsky was interested in identifying school systems that used various forms of evidence to inform their organizational decisions with the anticipated outcome being improved teaching and learning. Zavadsky (2009) explained that open discussions regarding data/evidence has led to identifying more avenues for improve school's curriculum and instruction. She wrote:

The best practice use of data as illustrated by the three featured Broad Prize finalists are valuable for two reasons. First, they demonstrate how higher performing school systems have focused on the most strategic and effective ways for improving student learning by using data as a guide. All three districts assert that data have been an important catalyst for increasing student achievement and narrowing achievement gaps.

In order for a school or school system to be able to use data/evidence in its decision-making processes, one must be able to identify and correctly categorize it so it may be used within its proper context. The following section takes a brief look at the various types of data readily available to schools in their pursuit of making decisions that positively affect the overall success of the school organization.

## **Types of Evidence/Data**

According to Webster's dictionary, data can be defined as "factual information that can be used as a basis for reasoning, discussion, or calculation." Various dictionaries define evidence as something providing proof. Hargreaves (1997) said that the educational definition of evidence is specific information or data that verifies effective practices in the school organization. With the increased measures of accountability brought about by federal legislation such as No Child Left Behind, school evidence has never been more important. It is necessary for school leaders to view factual evidence about their organization on a regular basis (Shen et al., 2010). Looking at and successfully interpreting collected data is one of the primary ways a leader can measure progress toward the school organization's vision. In order for data to be quality, it must be useful. With the passage of NCLB, school leaders are now required to look more closely at disaggregated data, which is broken down by particular subgroups of students (Brunner et al., 2005). As a result of this, school leaders can gauge a clearer understanding of where deficiencies lie among various student groups. Data/evidence should be used as a resource for deep, meaningful conversations revolving around continuous improvement of the school organization (Park & Datnow, 2009). According to Brunner et al. (2005), the accumulated data should be used to inform the decisions of the school leadership. Marchant and Paulson (2009) said decisions that are made as a result of school data must come about as a result of processes that are sound. Bernhardt (2004) made it clear that schools seeking to improve student achievement in their school organization have put data analysis plans in place to assist in planning for the future. Using factual information can make a big impact in assisting school leaders in improving the organization through informing the development of processes and strategies that can be used in the classrooms and will directly affect student learning.

Although schools do not deliberately overlook various types of school evidence, some are generally not taken into account as much as others. Since test scores are mentioned more than other types of evidence, sometimes school leaders have a tendency to focus on that particular type of school data. However, when one takes a closer look, there are other types of data that can have a major impact on the direction of the school organization. School organization members can make better, more effective decisions by utilizing multiple sources of evidence. Bernhardt (2004) broke school data down into four major categories, which can be used for decision purposes. They are 1) Student Learning Data, 2) Demographic Data, 3) Perception Data, and 4) School Process Data.

### **Student Learning/Achievement Data**

Victoria Bernhardt (2004) stated, “Most school improvement efforts focus on increasing the learning of all students. Measures of student learning help us understand how students are performing and what students know as a result of instruction” (p. 100). The most common form of evidence used by schools is student-learning data. Since the passage of NCLB and ESSA, schools have been pushed to find ways to document student academic growth (Wohlstetter, Datnow, & Park, 2008). Results from standardized tests are one of the ways a school measures student academic growth.

Through the years, student learning has been measured in a variety of different ways including, but not limited to, standardized tests, authentic assessments, teacher-made tests, homework assignments, performance and other standard-based assessments (Bernhardt, 2004). By looking at the collected evidence from the above-mentioned list, school leadership can gain a better understanding of where a student stands academically. School personnel can use this evidence to compare and contrast to help determine if the student is actually learning the

materials being taught. According to Bernhardt (2004), it can also give teachers an idea as to how a student learns best. By using student-learning data, schools can gain valuable information and insight on what needs to be improved upon. According to Brunner et al. (2005), raising test scores is the ultimate measure of success. No Child Left Behind required that all students, in all subgroups, meet proficiency grade levels in reading and mathematics by the year 2014. This has played a major role in the examination of student learning data and will continue to play a major part for years to come.

Jeffrey Wayman and Sam Stringfield (2006) conducted a qualitative case study, which involved three separate schools. An elementary school, intermediate school, and middle school were chosen to participate. Two of the schools were located in the northeastern part of the country, while one school was located in the South. The study revolved around the participating schools faculties' involvement in the examination of student achievement data through the use of technology for instructional improvement purposes. They wrote: "The educators in our study often observed that gaining whole knowledge of student learning enabled them to examine their own practice and make changes that provided better learning experiences for students" (p. 000). By analyzing student achievement data, school officials (teachers and administrators) can make necessary adjustments to instruction to positively affect student learning (Hamilton et al., 2009).

### **Demographic Data**

Demographic data is the second of the four major types of data, according to Bernhardt (2004). Demographic data includes detailed information regarding the make-up of the school organization. It provides the statistics of the school. Total student enrollment, subgroup information (gender, ethnic background, and language difference), student attendance, and ages are all examples of demographic information that can be found in school organizations. One

could also include community demographic information as well, because it involves stakeholding groups that have a direct and indirect effect on the school organization. Bernhardt (2004) said demographic data are very important for school leaders to understand. Looking at demographic data over a period of time can indicate dynamic changes in the make-up of the school organization. The statistics found in the demographic information of the school are something that cannot be controlled by school leadership (Bernhardt, 2004). Although school leaders cannot control the demographics per se, they can study the evidence to identify recurring trends or important outside factors that may directly or indirectly affect the school community.

Bernhardt (2004) said a school can somewhat accurately use the demographic information and check to see how well it has served a particular subgroup of its students. Skiba et al. (2011) conducted a quantitative study on the disproportionality of school discipline. The study looked at documented patterns of office discipline referrals. Through their use of student demographic information that included student ethnicity and class discipline referrals, the researchers identified disparities among the number of discipline referrals between white students and their minority counterparts. Demographic data can assist the school leader or school organization as a whole as to what the school looks like. Demographic data is necessary for disaggregating the data that is a vital portion of NCLB (Brunner et al., 2005). Demographic data serves a very important role in the plan for continuous improvement within the school organization (Bernhardt, 2004).

### **Perception Data**

Perceptions, according to Webster's Dictionary, carry the same meaning as words such as views, beliefs, and opinions. Perception data are any type of data that helps school leaders to understand the thought processes of stakeholders with the organization. According to Shen et al.

(2010), perception data in the school organization simply describes what stakeholders think about the school's learning environment. In essence, it is how those selected stakeholders see the world (Bernhardt, 2004). It is a measure of the mental models that people hold about various topics. Perception data can be measured in various ways and can give leaders ideas about important environmental improvements that need to be made for the organization to thrive. The most common way to measure perceptions of various groups of people would be through a survey instrument. Whether through a written survey or oral survey, the information gathered will better inform the person conducting the study as to the thoughts and opinions of those chosen to participate. In a school organization, it would be important for a school leader to measure the perceptions of students, parents, and teachers to help with setting goals for improvement. According to Bernhardt (2004), it can give leadership a better understanding of what type of changes are possible.

In a study conducted by Karen Seashore Louis, Beverly Dretzke, and Kyla Wahlstrom (2010), survey results were compiled from a national sample of educators on school leadership's effects on student learning. After analysis of close to 4,500 respondents' surveys, the researchers were able to identify a number of leadership traits that some stakeholders feel are important to the learning process. Similarly, schools can use perception data from its own stakeholder population to gauge where and how organizational improvements need to be made.

### **School Process Data**

The final type of data that can be used to inform school leadership is School Process Data. Shen et al. (2010) referred to this type of data as the programs the organization is using to get the type of results the organization is getting. Bernhardt (2004) said school process data are the only type of data in which the school organization actually has control. School processes are

simply what is going on in the classroom from an instructional standpoint and shows how they are changing. Bernhardt (2004) stated that process data are the hardest for teachers to actually describe because they do not document everything that is happening in the classroom on a daily basis. In some cases, the teacher has been teaching a certain way for so long that it has become second nature. In other cases, the instructional processes might change on a daily basis. One example of process data in schools is the Response-to-Intervention process (RTI). In their empirical study on the use of RTI in the middle school setting, Michael Faggella-Luby and Michelle Wardwell (2011) characterized RTI as this:

The (RTI) model is generally operationalized in one of two configurations: (a) as problem solving, in which a team of practitioners uses a recursive process to determine necessary instruction based on reasons for underachievement via a case by case analysis; or (b) as standard treatment protocol (STP), in which struggling students receive an initial standard intervention as a means to prevent failure. (p. 36)

School leaders and teachers use the RTI process to determine appropriate instructional courses of action with students who are experiencing difficulties in the regular classroom.

Other examples of school process data might include instructional programs in place in various classrooms (ex. reading programs), instructional time, location, student-teacher ratio, types of assessments used, classroom management, and relationships. This type of data is extremely important to the school organization in its continuous improvement efforts because these programs or teaching processes are what produce the results (Bernhardt, 2004). In order for a school organization to make changes, they must first know what it is they are changing. School organizations must look to document processes within their building and see where their

results are lacking. Only through documenting and looking at the processes intently in relation to learning can new processes to encourage learning be put into place.

Shen et al. (2010) singled out three main purposes for the school data. The first purpose revolved around student achievement. As has already been mentioned, No Child Left Behind (NCLB) has increased the levels of accountability for education professionals. With annually increasing standards, school leaders must find ways to make improvements in their schools. By looking at multiple data sources school leaders can better identify ways to bring about continuous improvement in their school organization. The second purpose for looking at data is for comparison purposes. School leaders can compare their students' performance on standardized exams to the norm reference for their particular subgroup. Student growth is also considered. The third purpose, according to Shen et al. (2010), is using the data for making important decisions regarding educational curriculum. Data can be used to group and place students, identify instructional weaknesses, or assessing proficiency levels in students in various subject areas (Shen et al., 2010).

As schools experience continued growth in the amount of school data compiled and accumulated, it is necessary for school leaders to identify ways to use data/evidence with their faculties. Developing a collaborative culture in the school organization that values the use of data/evidence in making important decisions is a difficult task (Kohm & Nance, 2007). In order for collaborative groups to work and a culture of inquiry to develop, certain structures must be organized within the school (Boudette, 2005). The following sections take a brief look at school leadership and systems thinking, both of which may be important variables in creating a collaborative culture that uses data/evidence to drive decision making within the school organization.



## **School Leadership**

High quality leadership can play a significant role in determining overall school success (Fullan, 2004; Leithwood et al., 2004; Marzano et al., 2005). Effective school leadership can have a significant impact on student learning in the school organization. Traditionally, the school administration has been the school's primary decision makers. The perception was that either principals or school superintendents made the important decisions regarding the schools in which they were placed in charge. Action researchers and notable school leaders have concluded that the issues that schools are dealing with in this generation are unprecedented and quite a task for any one individual (Somech, 2010). In this day and age of mandated continuous improvement it has been necessary for school organizations to re-evaluate the types of leadership that have guided them in the past. "School leadership seems critically important for developing a community of evidence-based practice" (Kensler et al., 2012, p. 49). Many school leaders are beginning to take "deliberate steps to build a culture that supports inquiry" (Copland, Knapp, & Swinnerton, 2009, p. 159). This type of organizational culture requires the input of many members. Park and Datnow (2009) stated that distributed forms of leadership are appropriate in schools using data/evidence to inform and make decisions. Distributed leadership is a leadership style that is being put into practice by various school leaders today to help create "cultures of inquiry" (p. 159) within the school building.

### **Distributed Leadership**

Researchers agreed there is a growing need for leadership beyond that of the school principal (Gronn, 2000; Spillane, 2006). By allowing others to have a stake in the process, the organization can benefit from the talents of a multitude of members (Leithwood & Mascal, 2008). According to Lezotte and McKee (2002), collaboration among school leaders and

faculty/staff is essential to the continuous school improvement process. More “decentralized” organizations are more likely to make better, informed decisions because of their willingness to utilize research-based methods (Hemsley-Brown, 2009). Tschannen-Moran (2001) stated that collaboration brought about the possibility for higher quality decisions among school organizations. One form of leadership that promoted this important concept of collaboration among various stakeholders within the school organization is that of distributed leadership.

Spillane et al. (2008) defined the concept of distributed leadership in schools as a form of leadership that involved multiple stakeholders, including individuals who were not classified as being in a leadership position. Mayrowetz (2008) described distributed leadership as important leadership activities that were extended to multiple groups of people within the school. Hargreaves and Fink (2008) indicated that through distributed leadership, multiple individuals worked to create a collaborative environment instead of the status quo, top-down organizational structure. Leithwood and Mascall (2008) stated that distributed leadership provided a way for organizations to benefit from a larger number of organizational stakeholders by benefiting from their expertise and reduced the chance of errors by the limitations of placing the responsibilities of decision-making entirely on one individual. Scully, Kirkpatrick, and Locke (1995) stated that the involvement of other stakeholders in the decision-making process offered unique benefits in generating the capacities necessary for making quality organizational decisions. Harris (2005) made an important point that in distributed leadership, decision making is a collaborative effort among individuals working together through teamwork, professional learning communities, and other forms of organizational learning groups within the school organization. There is a need for a team of individuals to share in the decision-making responsibilities of the school because of the abundance of tasks, complexities, and increased accountability measures for the school

organization (Elmore, 2000). In distributed leadership, the leadership actions come about as a result of group decisions instead of individual mandates (Gronn, 2000). The members of the group attempt to work together to utilize their individual talents in a concerted effort. By allowing others to take part in the decision-making process, it fosters ownership throughout the organization (Leithwood & Mascal, 2008). In distributed leadership, a school leader does not divide leadership tasks among individuals and leave them to work alone. It is a conceptual framework under which an individual can gain a better understanding for the particular characteristics of leadership (Spillane et al., 2004).

Spillane (2006) defined distributed leadership as leaders and followers working together for the collective good within their organization. Spillane et al. (2004) detailed a conceptual framework for distributed leadership in schools made up of four basic ideas: (1) leadership tasks/functions, (2) putting leadership tasks into action, (3) social distribution, and (4) situational distribution. These ideas are divided into two major themes. Macro tasks are built around more complex issues involving leadership such as: shared vision, collaborative culture, professional growth and development, formative and summative evaluations, and school climate (Spillane et al., 2004). Micro tasks are much smaller but are still associated with the aforementioned macro tasks.

Gronn (2000) and Elmore (2000) both have their own ideas concerning distributed leadership, as well as their own conceptual frameworks. Elmore (2000) described distributed leadership in standard terms as he referred to it as taking individuals within a group with certain expertise and giving them tasks related to their strengths. His conceptual framework is made up of five major principles which are: (1) Leadership is responsible for instructional improvement, (2) Continuous learning is key to instruction, (3) Modeling, (4) Roles and activities of leadership

flow from expertise required for improvements in learning, and (5) Accountability and building capacity are important (Elmore, 2000). Elmore (2000) goes on to identify five specific categories for leadership roles within an organization. They are: (1) policy, (2) professional, (3) system, (4) school, and (5) practice (Elmore, 2000).

Gronn (2000) defined distributed leadership through the idea of the “activity theory” (p. 334). He used this because of what he described as its importance in explaining human behaviors (Gronn, 2000). Gronn (2000) described six parts that make up his theory of distributed leadership. Those include: (1) rules, (2) subject, (3) instrument, (4) object, (5) division of labor, and (6) community (Gronn, 2000). Gronn’s work concluded that leadership is essential, but it must find ways to meet the ever-changing needs of the organization.

### **Distributed Leadership and the School Improvement Process**

According to Silins and Mulford (2002), student achievement has a higher percentage of improvement when distributed leadership is used within the school organization. Their study, which included 96 Australian secondary schools with over 5,000 students and 3,000 school faculty, focused on three major areas. Those areas included school leadership, organizational learning, and student achievement. In order for distributed leadership to become an important part of the school culture, in most cases, significant organizational change must take place.

Collaboration must be embedded within the organizational structure and valued by its members (Leithwood et al., 2006). Collaboration is a key component of a learning organization.

Leithwood et al. (1998) stated that the idea of learning organizations in schools gained traction in education circles as a result of the increased accountabilities placed on schools to perform to higher degrees of achievement.

As the push for learning organizations in schools began to build, there became a need for increased opportunities for collaboration. Collaboration among colleagues is essential for producing positive attributes associated with distributive leadership, which can be accredited to the development of stronger working relations. “School principals may want to reflect on the degree to which their faculty engages in collective, collaborative evidence-based practice and whether they are facilitating the conditions for this work to take place” (Kensler et al., 2012, p. 50). An organization that establishes a culture of collaboration is much better at utilizing best practices because of the value that is placed on learning (Hemsley-Brown, 2009). According to Rosenholtz (1989), strong, positive working relationships and strong collaborative working environments helped to facilitate positive change. Rosenholz (1989) also said strong working relationships between all school organizational members were characteristics found in better performing schools.

According to Wahlstrom and Louis (2008), teachers have a role in the decision-making processes of a school, which utilizes distributed leadership. In schools that follow the distributive leadership model, groups, rather than individuals, share in the responsibilities of making decisions for the entire organization (Harris, 2005). According to Somech (2005), through distributed leadership, teachers are more involved in the decision-making process, which leads to a heightened level of ownership. This level ownership is increased because of teacher participation and the ability of teachers to use their own individual talents.

### **Distributed Leadership and Trust**

According to Tschannen-Moran (2001), trust is a major contributor to organizational effectiveness. It is essential for true collaboration to take place in school organizations. Trust in all levels of the organization has become an important component as schools move to be more

collaborative (Tschannen-Moran, 2004). According to Wahlstrom and Louis (2008), school organizations that displayed higher levels of trust were more engaged in shared decision-making for the benefit of their students. “Collaboration holds the possibility of higher quality decisions” (Tschannen-Moran, 2001, p. 327).

Kensler et al. (2009) conducted a study of surveys from close to 3,000 middle school teachers from two different states, New Jersey and Pennsylvania. The survey measured democratic community, team learning, and trust in the school organization. The study found increased levels of faculty trust in schools with more democratic communities (Kensler et al., 2009). Kensler wrote: “With improved trust, teacher practices likely lead to improved learning. It seems likely as well that as teacher’s practice improves, school leaders will trust their teachers with increased levels of participation and meaningful decision-making” (p. 709).

Louis, Dretzke, and Wahlstrom (2010) conducted their study on leadership’s effects on student achievement. This mixed methods study examined teacher surveys from the years 2005 and 2008. One hundred eighty (180) different schools from 45 districts in 9 states, which included 4,491 teachers, participated in the study. In the findings, the researchers stated:

The results indicate that student math achievement scores are significantly associated with focused instruction, professional community, and teachers’ trust in the principal. Trust in the principal and professional community is both associated with student math achievement, which suggests that relationships among adults may be important factors determining how well students perform. (p. 325)

The implications from the aforementioned studies are that through utilizing more democratic leadership structures, school organizations can increase levels of trust in various stakeholder groups which may lead to increased student academic performance.

## **Distributed Leadership and Barriers**

Harris (2004) mentioned multiple obstacles to the implementation of distributed leadership within the school organization. The barriers included: organizational social structures, financial issues, and changes to the status quo. One major point involved school organizational leaders deciding whom to choose to help make the decisions. By picking certain organizational members outside of the school's leadership to make decisions, it carried the risk of upsetting the relationships of the faculty. Harris (2004) felt that decisions involving selecting others to help in the decision-making processes of the school should not be done haphazardly. Harris (2004) wrote:

The empirical evidence about distributed leadership and organizational development is encouraging but far from conclusive. We need to know more about the barriers, unintended consequences, and limitations of distributed leadership before offering any advice or prescription. We also need to know the limitations and pitfalls, as well as the opportunities and potential of this model of leadership practice. (p. 18)

Although evidence suggests this leadership style has a positive implication, more empirical studies on schools utilizing this particular form of leadership style.

### **Leadership: Conclusion**

Distributed leadership focuses on the members within an organization working toward a collective purpose. The structure under which organizational leaders choose to work is considered by many to be an important ingredient in the overall success of the organization. According to Spillane (2006), distributed leadership should be looked at as a conceptual framework under which one can lead an effective organization. Lasley (2009) said that the highest quality of evidence based decisions come about as a result of appreciation for the process

and the ability to act on the information. Without allowing uniquely skilled organizational members such as teachers to have input, school building leaders will have a difficult time getting this stakeholding group to develop ownership in future changes. By distributing leadership and allowing for other organizational members voices to be heard, it creates an atmosphere that will be more conducive to bringing forth the highest quality decisions. With the growing amount of data/evidence to sift through, members of the school organization charged with making decisions need a framework from which to work and make sense of it all. Systems thinking tools are a suitable framework from which school organizational stakeholders can work to make thoughtful evidence-based decisions.

### **Leadership Tools**

In this era of increased accountabilities, many school organizational leaders spend a great deal of time focusing on the outcomes or results of the decisions they make instead of the processes by which they make them. “The skills related to using multiple forms of data, seeing their interrelatedness and interdependencies, and transforming practice based on evidence are not developed quickly” (Kensler et al., 2012, p. 50). In this section, a process for making evidence-based decisions will be introduced. According to Shaked and Schechter (2016) instructional leaders could benefit from the use of a “comprehensive theoretical framework that is accompanied by complementary strategies” (p. 184). Systems thinking principles provide a necessary theoretical base and set of tools for working the most multifaceted problems that challenge us as individuals, groups, or in organizations as a whole (Senge, 1999). It provides ways of viewing the world holistically and using that viewpoint to find points of emphasis for essential change. It assists in helping individuals or organizations gain a new level of understanding of why certain happenings occur the way they do. It also works to offer more



room for innovative solutions (Systems Thinking Collaborative). “Systems thinking may be helpful in dealing with the challenges faced by today’s school principals” (Shaked & Schechter, 2016, p. 468).

### **Systems Thinking**

Systems thinking is a concept that has existed for many years. It is a philosophy that looks at the world in terms of a collection of independently functioning systems that make up our current reality. According to Ackoff (1999), a system is something that cannot be divided without losing its essential functions. As Senge (1990) put it, all systems “are bound by invisible fabrics of interrelated actions” (p. 7). A system must be made up of two separate parts, which are defined independently according to their individual purpose within the system. The interconnectedness of the individual parts is necessary for the whole system. For years, philosophers have attempted to get others to see the interconnectedness that exists between living things. Senge et al. (2000) defined systems thinking as “the ability to understand interactions and relationships in complex, dynamic systems” (p. 239). Systems thinking can be thought of as being part of a shared circle of effects. No component within the circle can be changed without affecting the rest of the components that make up the circle. Forrester (1994) said that although systems thinking’s definition is not clear, it can provide an overview to how systems work. In working with systems dynamics and systems thinking it is essential to understand the interconnectedness associated with all of the parts. Without this understanding it is hard to gauge the results of particular actions or interventions within the organization. Senge (1990) made reference to the importance of recognizing interconnections and the positive attributes of doing so. Maintaining a focus on the vision and being proactive in dealing with unintended consequences are positives, which help in bringing about longed for change (Senge, 1990).

Organizational leaders who are aware of systems and place value on systems thinking can use the tools within their organization to bring about positive change through the organization's continuous improvement process, professional learning communities, and the examination of cause and effect relationships through looping (Thornton, Peltier, & Perreault, 2004).

Shaked and Schechter (2016) conducted a qualitative study on the use of systems thinking by school middle leaders. The participants in the study included 93 district level school coordinators from school systems within Israel. Findings from the study included: being able to see the whole beyond the parts, multidimensional views helped with understanding others, seeing the interconnectedness of events, and identifying one's role within the organization.

Kelly (1998) said the concept of systems thinking has changed over time and has included a number of different ideals. This has caused individuals to change their perceptions toward systems thinking, as it means different things to different people. Kelly (1998) goes on to discuss a systems approach as an alternative way of thinking. According to her, this particular approach asks individuals and organizations to identify important information about the organizational structure and the particular behaviors of the system. The identification of these items is essential when attempting to develop effective ways of policing the expectations of the organization. Systemic thinking supports learning within organizations and looks to bring about movements in the mental models of the individuals within the organization. According to Kelly (1998), taking a systemic approach benefits organizations through offering a common language for all stakeholders, which can work to support increased collaboration and communication. Kelly (1998) proposed that taking a systemic approach could possibly lead to the development of sustainable patterns of action which could bring about significant cultural changes.

Systems thinking is one of the five disciplines identified by Senge (1990). The five disciplines as explained by Senge (1990) are as follows: 1) Systems Thinking, 2) Personal Mastery, 3) Mental Models, 4) Building a Shared Vision, and 5) Team Learning. All of the components of the five disciplines work together to help organizational leadership create an environment for continuous improvement through building capacity and an increased level of ownership throughout the organization. I will briefly define the other disciplines associated with learning organizations as presented by Peter Senge.

### **Personal Mastery**

According to Senge (1990), an organization's "commitment to and capacity for learning can be no greater than that of its members" (p. 7). Personal mastery can be defined as an organizational member's current reality in conjunction with their personal vision for the future. It is described as what matters most to the individual on a more spiritual level. Senge (1990) referred to personal mastery as a sort of spiritual foundation for the organization. Personal mastery is all about one's vision for setting higher standards and achieving higher results.

### **Mental Models**

Mental models are defined as how organizational members view the world. These are the subconscious, deeply embedded assumptions about how organizational members feel the world should work. As Senge (1990) wrote, mental models are "assumptions, generalizations, or even pictures or images that influence how we understand the world and how we take action" (p. 8). Mental models held by organizational members can become issues that lead to misunderstandings and conflicts, which can keep the organization from moving forward. Senge (1990) mentioned the importance of bringing mental models to the surface and "hold them to rigorous scrutiny" (p. 8). Examination of one's own mental models is essential to the systems

thinking process. When working within a team concept for organizational problem solving purposes, being open to the ideas of others and communicating differences will allow for deeper, more meaningful conversations. Without stressing the importance of examining mental models this will not be possible. Thomas Lasley (2009) made the point that the decisions and endorsements that come about as a result of the collaborative work do so as a result of the mental models of the individual members. This makes the examination of individual mental models all the more important. If members do not value the importance of exploring their own mental models about evidence before making decisions on it, they run the risk of letting personal biases influence decisions.

### **Shared Vision**

The development and identification of a shared vision among organizational members is a key to organizational improvement (Senge, 1990). “At its simplest level, a shared vision is the answer to the question of what do we want to create” (Senge, 1990, 2006. p. 192). A shared vision provides direction for the organization. It helps to guide the learning activities that must take place in order to meet the objectives that have been set forth by the organizational members. In order for a shared vision to be created, communication between various members all across the organization must take place. According to Senge (1990), dialogue is an extremely important part of creating and developing a shared vision. Active participation from members all across the organization is a necessity in order for the shared vision to sustain.

### **Team Learning**

“Team Learning is the process of aligning and developing the capacity of a team to create the results its members truly desire” (Senge, 1999, 2006, p. 218). Team learning happens when a group of people who are working on a project collectively experience a feeling of cooperation,

collaboration, and productivity. Alignment is a necessary component of team learning. Once organizational team members start moving in the same direction, individuals within the team begin to use their personal talents to work together for the purpose of working toward achieving the organization's shared vision (Senge, 1990). The team learning process is one of performing, evaluating, and performing again (Hensley-Brown, 2009). The team learning process also incorporates ongoing reflection as a source of learning for the team members. The collective efforts of team members, working together toward achieving the shared vision, far exceed the individual efforts of a few members going the course alone. As with distributed leadership, team learning involves an extraordinary amount of respect and trustworthiness.

### **The Continuum of Systems Thinking**

Senge et al. (2000) said, "The discipline of systems thinking provides a different way of looking at problems and goals – not as isolated events but as components of larger structures" (p. 78). It is an intriguing look at how systems are constructed and react to various conditions. Participants use systems thinking tools to help them find points of "leverage" to assist in bringing about a change for the organization if one is so desired. Senge et al. (2000) listed a continuum of systems thinking for the different approaches and views to the subject. Table 2 shows the continuum.

Table 2

*The Continuum of Systems Thinking* (Senge et al., 2000, p. 79).

- 
- “System-wide thinking”: Efforts to enact change throughout an organization (like a school system) instead of in one narrow domain.
  - “Open systems thinking”: This school of systems thinking seeks to understand a system in terms of its inputs, outputs, throughputs, and boundaries.
  - “Human systems thinking”: This is a way for people’s roles and relationships to interact, leading to results that no one would choose but that they cannot escape.
  - “Process systems thinking”: Emerging through the quality movement and reengineering, this form of systems thinking sees an organization as a set of information flows. By realigning the communication structures, the patterns of behavior of the organization will change.
  - “Living systems thinking”: Various forms of complexity and chaos theory, along with the theories of Humberto Maturana, David Bohm, and Lynn Margulis, suggest that emergent systems exist – that patterns of order will develop from chaos, much like life-forms develop.
  - “Feedback-related systems thinking”: or just “systems thinking” (sometimes called “systems dynamics” or “systems thinking”): A wide array of techniques and tools that have developed out of an understanding of dynamic feedback processes (reinforcing and balancing loops). These tools include simulations, stock-and-flow diagrams, causal loops, system archetypes, and conversations about feedback.
  - “System dynamics simulation”: The type of system analysis developed and championed by Jay Forrester and his colleagues, in which feedback interactions are represented by nonlinear mathematical equations. Since nonlinear equations describe accumulations and exponential growth, and since these equations are generally too complex for people to manipulate beyond a rudimentary level, system dynamics has depended on computer modeling and simulation.
- 

### **System Thinking: Tools**

According to Bernhardt (2004), there are multiple ways to look at school evidence. She, along with other researchers, such as Peter Senge (1990), suggested using a systemic approach. Shen et al. (2010) made reference to the possibilities of the interconnectedness between the different types of evidence and how they affect one another. Bernhardt (2004) describes the

school as a “system” involving all of the intangibles that work together to produce student learning (p. 13). Systems thinking is important to the school decision making processes because it involves delving into the possible interrelationships between all of the variable parts. Peter Senge (1990, 2006) described systems thinking as a “conceptual framework, a body of knowledge and tools that has been developed over the past fifty years, to make full patterns clearer, and to help us see how to change them effectively” (p. 7). Systems thinking takes the principles of systemic behavior and applies them in practical ways to common problems in organizational life. By identifying important information/school sources of evidence, systems thinking tools can be used to assist in developing a plan for continuous improvement. By taking a systemic approach to viewing and analyzing data and evidence, it helps school leaders better understand the organization as a whole, as well as the results that are produced (Bernhardt, 2004).

Prestridge (2013) conducted a case study on the use of systems thinking tools for school improvement purposes. His study included a school district in the Midwestern region of the United States that had incorporated systems thinking into their school decision making process. The participants in the study included district staff, school leaders, and teachers who had all used aspects of systems thinking on some level. The findings of the study included systems thinking being credited with creating an avenue for a more effective school decisions making process.

In systems thinking there are sets of tools which can be used to assist with looking intently at evidence and data to help determine whether or not changes are needed within certain areas of the organization. Tools such as Behavior-Over-Time Graphs (BOTGs), Causal Loop Diagrams (CLDs), and frameworks, such as the Iceberg Model, are continuing to gain popularity with systems thinking organizations. Behavior-Over-Time Graphs are used for describing

relevant patterns. Causal Loop Diagrams are used as visual maps representing the structure of the system. The Iceberg Model helps individuals and organizations explore deeply embedded mental models or assumptions that drive recurring issues. According to Pegasus Communications, these tools allow organizations to (1) graphically depict an understanding of a particular system's structure and behavior, (2) communicate with others about that understanding, and (3) design high-leverage interventions for problematic system behavior.

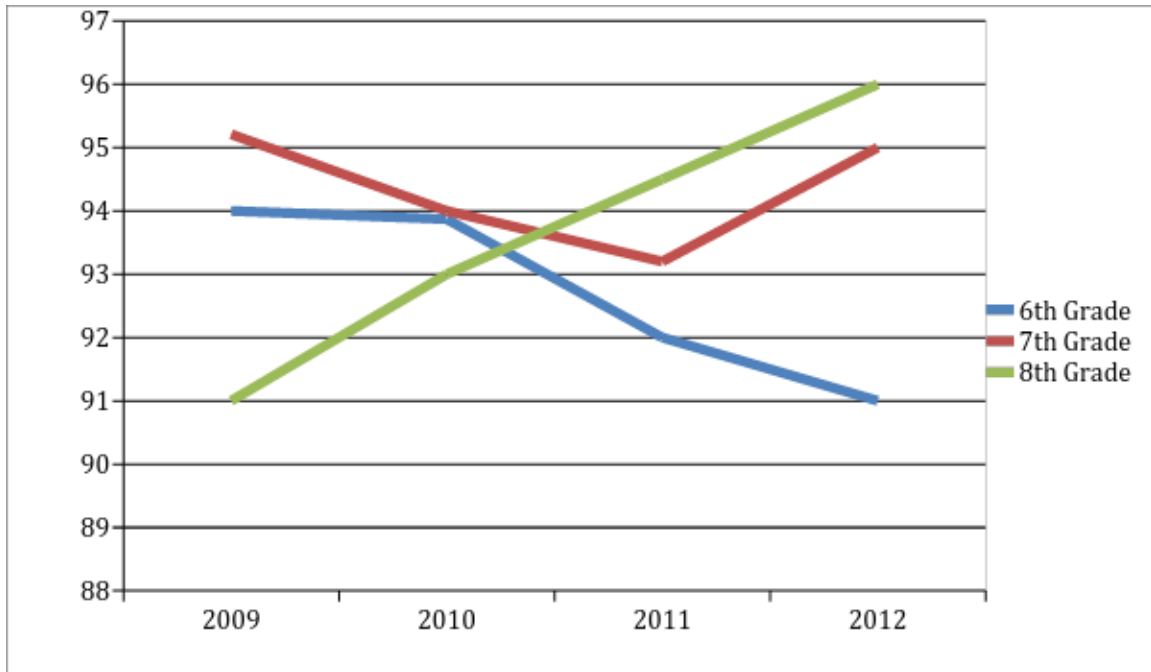
### **Behavior-Over-Time Graphs (BOTGs)**

According to Senge et al. (2000), Behavior-Over-Time Graphs are very basic, easy to use visual tools. "Behavior-Over-Time Graphs are tools that can help organizations focus on recognizable trends/patterns of change over time rather than on particular actions. This may lead to significant discussions on how and why the identified area is changing" (The Waters Foundation). Behavior-Over-Time Graphs are basic line graphs, which show a trend/pattern of change of a variable over time (The Waters Foundation). Behavior-Over-Time Graphs can be built upon or can stand alone in helping organizations think about identifiable patterns/trends (Senge et al., 2000).

According to Senge et al. (2000), Behavior-Over-Time Graphs are very useful in assisting individuals/organizations to visually see the patterns and trends in their organizations. By identifying trends/patterns, organizations/individuals are more likely to start asking questions about the particular changes.

Below is an example of a Behavior-Over-Time Graph, which shows attendance rates for students, teachers and school administrators of a middle School over a 6 year period.





*Figure 2.* Behavior-Over-Time Graph detailing attendance rates for three subgroups over a 3 year period from 2009–2012.

### **Causal Loop Diagrams (CLDs)**

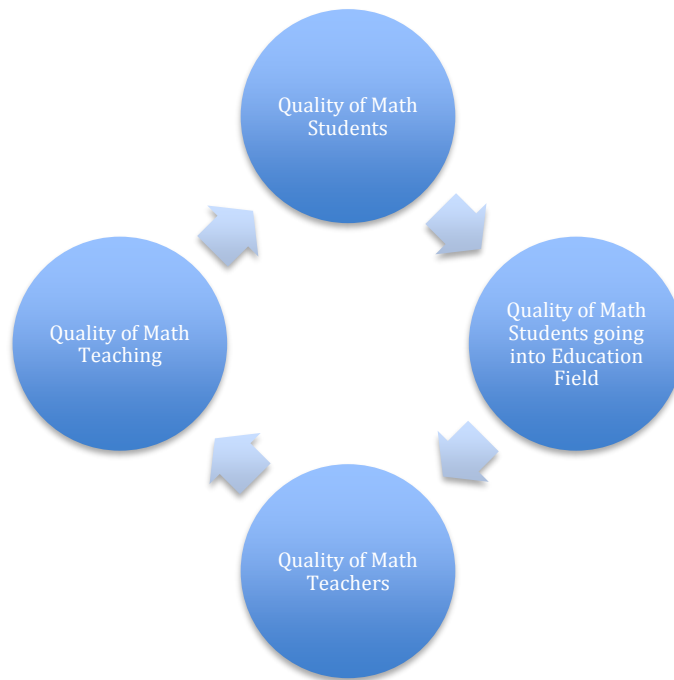
“Causal Loop Diagrams help organizations to understand and communicate the interactions that determine the dynamics of a system” (The Waters Foundation). Pegasus Communications said these diagrams are made up of arrows connecting variables (things that change over time) in a way that shows how one variable affects another. The Waters Foundation explained that system behaviors are generated from within the system and are the result of one or more causal (or feedback) loops. Causal Loop Diagrams (CLDs) illustrate how “structure generates behavior” within a system. Causal Loop Diagrams show causal relationships and illustrate circular feedback within a system. A cause becomes an effect, becomes a cause. One should be able to read around the loop several times. “What goes around, comes around.” One may choose to identify important CLDs by looking for causal relationships among behavior-

over-time graphs (BOTGs) that describe the system. An organization must identify a specific focus for the CLDs that they draw. One must take into account the overarching purpose and the audience for whom the loop(s) was intended (Senge et al., 2000). A CLD can help an organization tell a story or express their interpretation or mental model of how a particular system works or functions.

According to the Waters Foundation, causal loop diagrams contain four major elements.

- a. Variables that are related in cause/effect sequence(s).
- b. Arrows that indicate which elements are affecting other elements.
- c. Symbols associated with the arrows that denote the direction of the influence of the relationships.
- d. A central symbol indicating the overall identity of the loop (either “R” reinforcing or “B” balancing).

Figure 3 is an example of a Causal Loop Diagram which shows related events that support or reinforce the quality of math students in schools.



*Figure 3.* Reinforcing Causal Loop Diagram pertaining to the quality of math students.

Senge et al. (2000) had this word of caution about the intended use of causal loop diagrams with students in a school setting.

Keep in mind that, despite their seeming complexity, causal loop diagrams represent an oversimplified view. They were originally developed as a communication tool, a simple visual way to show the basic dynamics in a system to non-modelers. They can be a wonderful way to begin conversation, but they don't necessarily lead students to ask their own questions about a system. (p. 243)

### **The Iceberg Model**

The Waters Foundation defined the Iceberg Model as a systems thinking tool, which can be classified as a framework for looking at a system beyond individual events. By delving more deeply into system trends, structures, and mental models, and individual or an organization can consider potential leverage. According to Senge (1990, 2006) leverage is a way of “seeing

where actions and changes in the structures can lead to significant, enduring improvements” (p. 64). The Iceberg Model creates ways to explain reality through using combinations of systems thinking tools to identify root causes and for re-examining individual/organizational mental models. At the top of the model is the tip of the “iceberg” which can be seen. This is representative of the events or issues that can be seen by all. Just below the surface level is the part of the iceberg, which is related to identifying patterns and trends. As stated earlier, Behavior-Over-Time Graphs are systems thinking tools used specifically for identifying patterns and trends within an organization. After examining BOTGs, the individual/organization can move deeper to the next area of the Iceberg Model, which involves examining the systemic structures that are in place that contribute to the recurring patterns and trends, which were earlier identified. Senge (2009) defined systemic structure as:

A set of unrelated factors that interact, even though they might be widely separated in time and place, and even though their relationship may be difficult to recognize. When studied, these structures reveal the points of greatest leverage... These are not necessarily the points of highest authority; they are the places where the ingrained channels of cause and effect are most susceptible to influence. (p. 82)

Causal Loop Diagrams assist in helping individuals/organizations gain a better understanding of the identified patterns and trends. The use of CLDs can help shed new light on the systemic structures that are currently in place within the organization which make the identified patterns and trends possible (Senge et al., 2000).

The deepest point of the Iceberg Model asks individuals/organizations to examine their mental models in relation to the information that has come about as a result of the

aforementioned steps. What deeply embedded assumption(s) does the individual/organization hold to that enables this identified issue/problem to persist?

Kohm and Nance (2007) gave an example of a superintendent's use of the iceberg model to look at a particular demographic's standardized test scores in relation to their peers. The superintendent's use of the iceberg brought to the surface his school faculties' mental models associated with why this particular subgroup was not performing at a desirable level. As a result he was able "to build new and potentially more productive models" (p. 184). The Iceberg Model presents a way to incorporate the use of multiple systems thinking tools to not only identify root-causes of issues or problems within an organization, but works to help organizational members/individuals to re-examine their mental models and how they see the world. Figure 4 is a modified version of the iceberg model that includes the use of Behavior-Over-Time Graphs, Causal Loop Diagrams, and Mental Models.

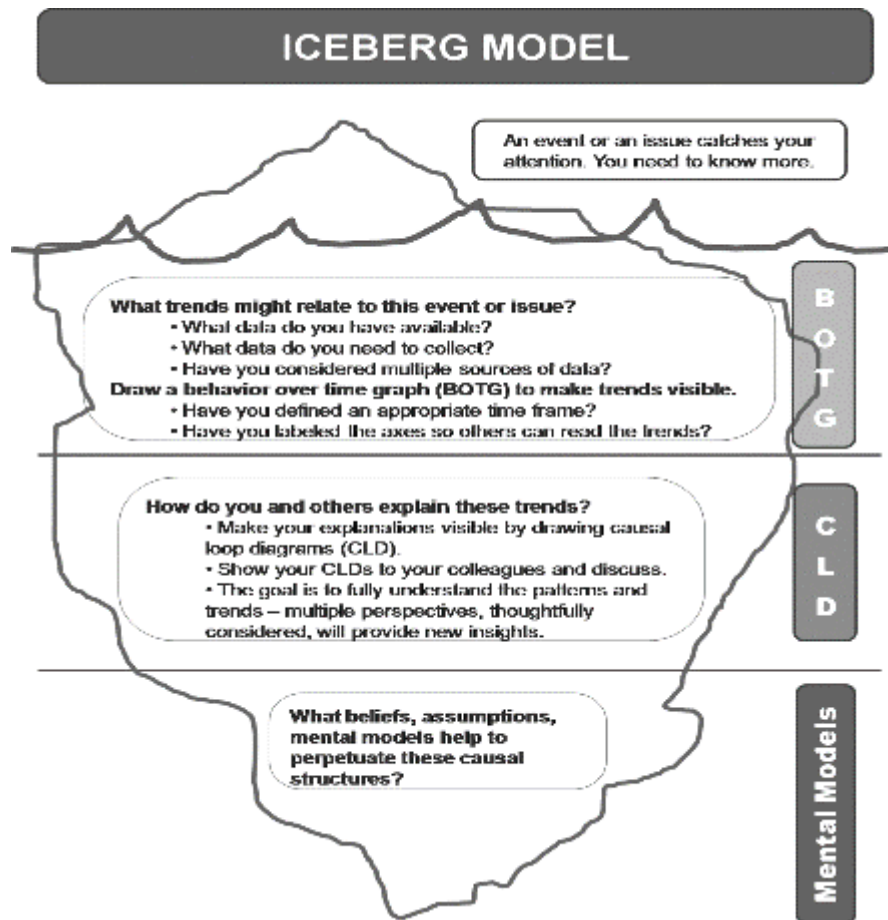


Figure 4. The Iceberg Model structure that includes the use of Behavior-Over-Time Graphs, Causal Loop Diagrams, and Mental Models (Kensler et al., 2012, p. 53).

### Summary

With the passage of No Child Left Behind in 2001, along with more current legislation such as the American Reinvestment and Recovery Act of 2009 and ESSA, schools have become increasingly dependent on the use of evidence for identifying ways to improve their organizations. The question remains what types of structures are in place and what processes are being used by schools to look at the mountains of evidence/data that is available to them. Is the use of systems thinking tools the answer?

This review took a brief look at the existing literature regarding the concepts of evidence-based decision making, distributed leadership, and systems thinking. At its core, effective evidence based decision-making involves groups of invested stakeholders of an organization working together and looking at various types of evidence/data for the purpose of identifying recurring issues. This may lead to a spark of meaningful questions and conversations centered on those issues pertaining to the organization. In organizations with distributed forms of leadership what types of processes are used in making evidence-based decisions? Do schools that use systems thinking along with systems thinking tools in their evidence-based decision-making processes feel as if those particular thought processes have worked and have been effective for them? According to Bettsworth, Alonzo and Duesbery (2009), the lack of a thought out systematic approach to evidence-based decision-making has been a problem within school organizations. Is the answer to this issue of ineffective decision making a process involving systems thinking and systems thinking tools?

## CHAPTER III. METHODS

### **Introduction**

The idea of continuous improvement in schools has been in place for many years. The advent of No Child Left Behind in 2001, and the Every Student Succeeds Act of 2015, brought about an increased need for effective decision-making processes in schools because of increased accountabilities associated with the new federal laws. As a result, school systems all across the country began to re-evaluate their organizational decision-making processes. The Flair School District realized their need for a strategic framework for analyzing and disseminating the abundance of accumulated school data. The leaders of the Flair School District made a commitment to change their evidence-based decision-making processes by hiring Ms. Levesque as assistant superintendent of curriculum. Ms. Levesque was an expert in systems thinking and in the use of systems thinking tools. As assistant superintendent of curriculum, Ms. Levesque introduced school leaders within the district to systems thinking and its potential use as a framework for making informed decisions for their respective organizations. She implemented systems thinking in all schools throughout the district without reservation. She had extensive experience with the implementation process on the use of systems thinking in schools and knew how helpful it could be to the process of decision-making in the school environment.

Systems thinking provided a framework in which organizational leadership, as well as representatives from other important stake holding groups, could work together to make informed evidence-based decisions for the organizations they served. There is limited empirical



research on the use of systems thinking as a framework for which to view school data and make decisions. The purpose of this study was to determine how school leadership team members used systems thinking to make effective evidence-based decisions pertaining to the school organization. I conducted an intrinsic case study involving a middle school that regularly used system thinking tools to help guide the organizational decision making process. I addressed the following research questions throughout this project:

1. What successes were attributed to the use of systems thinking in the decision-making processes at Flair Middle School?
  - a. What prerequisites, if any, preceded the use of systems thinking in the decision-making processes at Flair Middle School?
  - b. What facilitated the development of systems thinking use in the decision-making processes at Flair Middle School?
  - c. What barriers inhibited the development of systems thinking use in the decision-making processes a Flair Middle School?
2. How were systems thinking tools used in the evidence-based decision making processes at Flair Middle School?
3. What are the possibilities for future use of systems thinking at Flair Middle School?

### **Why This Study is Suited to a Qualitative Design**

The main purpose of qualitative research is to acquire a better understanding of what is at the root of an experience (Merriam, 2014). This study focused on an experience in a specific system. It focused on how a middle school, whose leadership team was made up of school administrators and teacher leaders, practiced the use of systems thinking in the evidence-based

decision making processes of the school. This study gave me the opportunity to look at a middle school leadership team's use of systems thinking in the decision-making processes within the organization. My objective was to enable my participants to have their voices heard. Also, I made it a point to include observations from the school organization's environment to enhance the participant data gathered.

In this case study, I wanted to look at how systems thinking influenced the organization's decision-making processes. Merriam (2014) stated that qualitative research gives "the greatest promise of making significant contributions to the knowledge base and practice of education," because it is "focused on discovery, insight, and understanding from the perspective of those being studied" (p. 1). As a result, I made the decision to perform a qualitative study that gave the participants an opportunity to communicate their perceptions through multiple means that included participant interviews, site observations, and organizational documents.

### **Specific Methodology Employed**

This research study was an intrinsic case study of a Midwestern school that used a specific systems thinking framework within the organization for the purpose of making effective evidence-based decisions. Creswell (2014) stated:

Case studies are a design of inquiry found in many fields, especially evaluation, in which the researcher develops an in-depth analysis of a case, often a program, event, activity, process or one or more individuals. Cases are bounded by time and activity, and researchers collect detailed information using a variety of data collection procedures over a sustained period of time. (p. 43).

Berg (2009) described a case study as "a method involving systematically gathering enough information about a particular person, social setting, event, or group to permit the

researcher to effectively understand how the subject operates or functions” (p. 317). In this particular study, the case was a middle school located in a major city in the Midwestern United States. Data compiled and used in this study included organizational documents, observations, and participant interviews. Creswell (2007) stated all forms of data could be “grouped into four basic types of information: observations (ranging from non-participant to participant), interviews (ranging from close-ended to open-ended), documents (ranging from private to public), and audiovisual materials (including materials such as photographs, compact disks, and videotapes)” (p. 129). This bounded case study included various organizational documents, participant interviews, and direct observations.

### **Role of the Researcher**

When conducting a case study, the researcher is tasked with various roles within the study. According to Creswell (2007), the researcher is a “key instrument” (p. 38). “The qualitative researcher collects data through examining documents, observing behaviors, and interviewing participants” (p. 38). Researchers may use particular processes or tools for accumulating the data, but they are key to the overall process. Berg (2009) described four major roles for the researcher, which include: complete participant, participant as observer, observer as participant, and complete observer (p. 80). My role in this research project was somewhere in between observer as participant and complete observer. In my time spent at Flair Middle School, I made it a point to be as unnoticeable as possible during my site visits, as I did not want to interrupt the regular business of the school. Although I spent four days observing the operations of the school, as well as that of the school’s leadership team, I was more than just an observer. I spent four days interviewing participants and accumulating appropriate organizational documents and reports.

In order to carry out my responsibilities as the researcher, it was imperative for me to take extreme care during the preparation phase before the research actually began. I had the opportunity to attend a systems thinking workshop, which was held within the Flair School District before my actual research began. The workshop offered various levels of training for participants from all over the country. I split my time between the introductory and advanced level training sessions to gain a better understanding of how the tools were applied in the various schools throughout the district. The workshop was also instrumental in that it allowed me an opportunity to develop relationships with school leaders and teachers throughout the school district. But most importantly, the workshop helped deepen my knowledge of systems thinking and its application in the school setting. My knowledge base as it related to systems thinking was critical in the analysis of documents and reports that I accumulated. My academic training, as well as my personal intrigue, as it relates to systems thinking, helped me to gain a better understanding of what I observed and heard in the organization's use of the process. As a result of my experience with systems thinking, I was able to collect higher quality data which was important to my analysis.

### **Disclosure**

I feel it is important for me to inform the reader of the profound impact which systems thinking has had on both my personal and professional life. In the summer of 2009, I was introduced to systems thinking through a university graduate level class. Since that time I have used tools associated with systems thinking practically every day. Personally, I credit systems thinking for significantly changing my views on many social and political issues. By becoming more aware of my own personal mental models, I have been able to be more critical in why I believe certain things. By realizing the interconnectedness we all share as humanity, it has

enriched the relationships I have with others. This has helped me become a better husband, fathers, and son, not to mention a more productive member of society.

Systems thinking has also played a major role in my professional life as well. As a school leader I use systems thinking tools to address underlying issues within our organization on a regular basis. By using the systems tools, along with systems theory, my two schools have been able to pinpoint issues that have recurred for years and make improvements that have been a benefit to our students' academic, social, and emotional growth. I believe that the use of systems thinking has made me a more effective school leader.

### **Sampling**

Flair Middle School was a public school serving approximately 800 students in grades six through eight, just outside of a major Midwestern city. The school's demographic make-up broke down as follows: 42% African American, 40% Caucasian, 14% Hispanic, 2% Asian, and 1% Multi-Racial. The school employed 82 faculty and staff, 44 of whom were classroom teachers. The average class size had a ratio of 20 students to every teacher.

Before embarking on the journey of this study, the Flair School District required me and my fellow researcher to submit a research proposal in addition to the required documentation to conduct research by the Institutional Review Board (IRB) at Auburn University (see Appendix A). Once final permission was granted to conduct research, the process for identifying potential participants in the study began. The school's leadership team, made up of the school's administration and four other teacher leaders along with the school system's assistant superintendent, volunteered to participate in the study. Also, three classroom teachers who were currently using systems thinking in the classroom volunteered to be participants. Prospective participants from the school's leadership team received an email invitation from Flair Middle

School's principal, Mr. Savage, as well as the assistant superintendent, Ms. Levesque (see Appendix B). In my study, I used purposeful sampling, as the participants were relevant to the research question and they have experienced that which the research is attempting to uncover (Patton, 2015). According to Creswell (2007) "purposeful sampling is used in qualitative research. This means that the inquirer selects individuals and sites for study because they can purposefully inform an understanding of the research problem and central phenomenon in the study" (p. 125). The email invitation was only sent to the members of the administration and school faculty and staff who had a role of the school's leadership team and had taken an active role in the school's decision-making processes before using systems thinking and after using systems thinking.

As a result, 22 people received an email invitation to participate in the study. Seven teachers agreed to participate, along with two school administrators and the assistant superintendent of curriculum. Four of the teachers who participated in the study were current members of the school's leadership team. Three of the seven teachers were classroom teachers who were trained in systems thinking and had been past members of the leadership team. It was important that the participants were able to recall information from leadership team meetings prior to using systems thinking and after. Finally, it was critical to have participants who showed a willingness to take part in this study. Because of the uniqueness of the experiences of the individuals, I conducted private interviews with each of the participants (Stake, 1995).

### **Data Collection Methods**

For the purpose of this research, interviews with key school personnel from Flair Middle School were needed. The goal was to identify school personnel's perceptions on the use of systems thinking in making school decisions. Early on, fellow researcher John Prestridge and I

sent an email to the Assistant Superintendent of Curriculum and the Principal of Flair Middle School with hopes of finalizing the trip to the school's area. After several correspondences, I made arrangements for the initial research to begin during the final week of January. It was agreed upon that I would conduct individual interviews and observe the organization over the course of four days during January and would then return in March for a systems thinking conference held by the school system for further observation and document gathering, as well as follow-up meetings. I collected three types of data for this study. These included individual interviews, organizational documents, and observations with field notes.

Creswell (2007) noted "interviews play a central role in data collection" (p. 131). Interviews help others understand a participants' particular point of view. In this study, I needed participant interviews in order to gain a more complete understanding of the perceptions of the schools organizational members and how they aligned with the organization's use of systems thinking. I worked with Ms. Levesque, the Assistant Superintendent of Curriculum of the Flair School District, and Mr. Borden, the principal of Flair Middle School, to secure dates and times for the participants. In the consent process, I made the participants aware that participation in the study was voluntary and their identities and responses would remain confidential. Also, I informed the participants of their right to opt out at any time during the course of the study. I constructed semi-structured interview questions for the study. Berg (2009) stated that although these interviews generally had questions that were asked in a uniform way, the researcher has the ability to probe further and add to the standard set of questions. This was important to me because I felt it allowed for important information regarding the research topic to arise that otherwise might have gone uncovered. I recorded the interviews with an Apple iPad. Later, I transcribed the interviews onto a laptop computer. Once the transcriptions were completed, I

constructed summaries of each interview. I provided interview summaries to participants for their review via email. I scheduled follow-up discussions for clarification for two months following the initial interviews. I conducted the follow-ups via email, phone conference, and face-to-face meetings. This form of member checking was used as a strategy to allow participants the opportunity to confirm the information relayed to me during the initial interview portion of the study. Member checking was an important aspect of the data analysis process because it was used to reduce bias (Miles, Huberman, & Saldaña, 2014).

The second type of data I collected was organizational documents. According to Bernard and Ryan (2010), this type of data is “inexpensive and non-reactive” (p. 20). Berg (2009) said documents are useful in case studies because they are representative of “the views and perceptions of their creators” (p. 335). The organizational documents used in this particular study included two three inch spiral bound notebooks that contained professional development materials regarding the school system’s use of systems thinking. These documents were present in Flair Middle School and used during the leadership team’s monthly meeting, which I was able to observe. The notebooks were also distributed to organizational members during the school system’s annual Systems Thinking in Schools Conference that was held in the month of March. Also, I collected and used other documents used by the organization’s leadership team pertaining to systems thinking for analysis purposes.

Observation was the final form of data collected during my data collection stage. Stake (1995) stated that the researcher had an “obligation to pay attention to what they consider worthy of attention and to make conclusions” (p. 45). It was important for me to spend adequate time observing the school organization and to make note of the use of systems thinking within the school. Both structured and unstructured observations played a role in this section of the data



collection phase. I conducted structured observations over the course of my time while visiting the Flair School District and Flair Middle School. Structured observations took place during Flair Middle School's leadership team meeting, a professional development session conducted by the Flair School District, and in a classroom setting. While conducting the structured observations, I looked for specific use and references to the use of systems thinking. I conducted unstructured observations in the Flair Middle School lunchroom, the school hallways, and a principal meeting with an individual teacher. Again, I noted any reference or artifact pertaining to systems thinking. I recorded field note during and after the observation periods.

### **Post-Activity Data Management**

Kvale and Brinkman (2009) suggested that researchers should “think about how interviews will be analyzed before they are conducted” (p. 190). The same should hold true for other data collected during the research period. At the conclusion of my initial data collection period in January, I set aside specific time during the middle of the trip, as well as at the conclusion, for reviewing interviews, observation notes, and other documents gathered. I did this in an effort to manage the data in a way that would help with a more in-depth analysis at a later date. “The final analysis then becomes not only easier and more amenable, but also rests on more secure ground” (Kvale & Brinkman, 2009, p. 190). By examining the interview and observation data while it was still fresh, it gave me an opportunity to note specific items of importance to the study. Otherwise I would have run the risk of leaving out key information that could not have been replicated.

### **Data Analysis**

Glesne (1999) stated, “Data analysis involves organizing what you have seen, heard, and read so that you can make sense of what you have learned” (p. 130). I conducted the initial

stages of analysis of the various data collected after leaving the field site. This was helpful because it allowed me the opportunity to review the data while it was still fresh on my mind. Also, it allowed me the opportunity to reflect on my progress in answering my research questions and identifying commonalities. Bernard and Ryan (2010) described this process as, “looking for regularities” (p. 3).

I recorded the participant interviews via iPad and later transcribed verbatim using a laptop computer. I limited my note taking during the participant interviews. This allowed me to react to prompts given by the participants. I completed the transcriptions after all interviews were final and all data collected. I completed the analysis of these texts utilizing a five step process as described by Bernard and Ryan (2010). The five steps were as follows: “(1) discovering themes and subthemes; (2) describing the core and peripheral elements of themes; (3) building hierarchies of themes or codebooks; (4) applying themes and (5) linking themes into theoretical models” (p. 54).

Bernard and Ryan (2010) listed twelve techniques that researchers could use in theme discovery. These techniques include: (1) Repetition, (2) Indigenous Typologies, (3) Metaphors & Analogies, (4) Transitions, (5) Similarities & Differences, (6) Linguistic Connectors, (7) Missing Data, (8) Theory-related material, (9) Cutting & Sorting, (10) Word Lists & KWIC, (11) Word Co-occurrence, and (12) Metacoding. I determined utilizing repetitions, metaphors and analogies, and similarities and differences would be the most useful techniques for this study. Repetition is the act of saying or doing something repeatedly. I chose repetition because, as Bernard and Ryan (2010) stated, “The more the same concept occurs in a text, the more likely it is a theme.” (p. 57). I used metaphors and analogies because it is commonly used in “natural human speech” (Bernard & Ryan, 2010, p. 58). “People often represent their thoughts,

behaviors, and experiences with metaphors and analogies” (p. 57). Lastly, I used similarities and differences because it helped “keep the researcher focused on the data” (Bernard & Ryan, 2010, p. 58). Constantly questioning the data to see similarities or differences produced a deeper understanding of what was being researched (Bernard & Ryan, 2010). By using different theme generating techniques, I was able to distinguish generalities and generate categories for the different themes that rose to the surface.

As I discovered recurring themes, I began the creation of codebooks (See Appendix C), which assisted in the analysis phase of the research project. A priori codes were deduced by using the emergent themes from the literature review, as well as the conceptual framework of the study. The codebooks for this research project contained three kinds of codes: structural, themes, and memos. I gave structural codes to environmental notes involving the interviewer and respondent (Bernard & Ryan, 2010). I gave theme codes to special points identified in text, while memo codes dealt primarily with field notes (Bernard & Ryan, 2010). After I started the codebooks, I searched for patterns within the various sources of data that had been accumulated. The codebooks included a list of themes, along with definitions and exemplars. Also, I coded text grouped into various themes. I looked for patterns in the data as it was being coded. Although the codebooks were constantly evolving, the patterns identified enabled me to generate warrants and assertions. At this point I was able to begin my pre-writing process and list the warrants along with multiple assertions for each began.

### **Verification of Interpretation**

Creswell (2007) discussed various strategies for validation in a qualitative study. “Confirming or triangulating data from multiple sources, having studies reviewed and corrected by participants, and having other researchers review our procedures,” (p. 45), all play a role in

the validation process. Each of these played a role in this particular research study. According to Fetterman (2010) “Triangulation always improves the quality of data and the accuracy of the ethnographic findings” (p. 94). I accomplished triangulation through the use of multiple sources of data, which included: participant interviews, organizational documents and reports, and observational field notes. Stake (1995) stated, “For investigator triangulation, we have other researchers take a look at the same scene or phenomenon” (p. 113). I provided my accumulated data and reports to a fellow systems thinking researcher, John Prestridge, for peer review and discussion. Also, I used him as a second coder to create intercoder reliability in the data analysis phase (Bernard & Ryan, 2010). He used my codebook to code multiple pieces of data to verify my interpretations and possibly identify new areas I may have missed. The process was very informative as it gave me a fresh perspective on my data aside from my own personal biases. The conversations that resulted from the peer review were the most rewarding as it allowed me to talk through my study without having to work in complete isolation.

Due to the distance between the participants and me, I conducted member checks with participants by having them read through interview transcription notes and clarify statements using face-to-face meetings, email, conference calls, and Facetime. I was able to successfully communicate with each participant with regards to his or her interview data. It helped me to receive feedback from the participants. In two instances, the participants did not recall answering a certain way. Although my transcripts were correct, the participants asked to clarify their meaning. I updated the transcripts to include the clarifications by the participants. All of these steps were taken to ensure credibility within the study. To create intercoder reliability, two coders were used in the data analysis phase (Bernard & Ryan, 2010).

## **Conclusion**

This chapter presented an overview of the methods I used to conduct my case study of Flair Middle School's use of systems thinking tools. I described the research methodology, the role of the researcher, participants, data collection methods, data management, data analysis, and verification of interpretation for the study. The results of the findings for this case study are presented in chapter IV.

## CHAPTER IV. RESULTS

The purpose of this study was to determine how middle school leadership team members at Flair Middle School were using systems thinking to make effective evidence-based decisions pertaining to the school organization. Research questions addressed during the study included the following:

1. What successes are attributed to the use of systems thinking in the decision-making processes at Flair Middle School?
  - a. What prerequisites, if any, preceded the use of systems thinking in the decision-making processes at Flair Middle School?
  - b. What facilitated the development of systems thinking use in the decision-making processes at Flair Middle School?
  - c. What barriers inhibited the development of systems thinking use in the decision-making processes at Flair Middle School?
2. How were systems thinking tools used in the evidence-based decision making processes at Flair Middle School?
3. What are the possibilities for future use of systems thinking at Flair Middle School?

A case study was conducted at Flair Middle School in the Flair School District in order to possibly answer my research questions. While at Flair Middle School, I interviewed classroom teachers and school administrators. Participants described their experiences and perceptions with

the use of systems thinking in making evidence-based decisions. I transcribed the semi-structured interviews, and sent member check summaries to participants for needed clarification. Initially, I coded all of my own data. After my initial coding, I enlisted the help of a colleague, who has a high level of familiarity with systems thinking, to code a significant portion of the data a second time. In addition to interview transcripts and my field notes, I coded a third piece of data and used it for the triangulation purposes. This particular piece of data was a 179-page manual provided to administrators and teachers who participated in Systems Thinking Training/PD for the Flair School District. For the purpose of this research project, I will refer to this manual as STM, or the Systems Thinking Manual. The STM provided valuable insight into the depth of training participating members had received in the use of systems thinking.

### **Background**

The participants of this study were comprised of one district level school administrator, two school level administrators, and seven classroom teachers from Flair Middle School, which is located in a suburban school district in a Midwestern state in the United States. The participants ranged in age from 28 to 62 years old. Participants ranged from 6 to 40 years of educational experience. All school level participants reported leadership team experience over the prior four years. For reporting purposes, as well as to protect individual participant identities, I assigned pseudonyms to participants in this study. I asked the participants a question during their individual interview regarding their experience level with systems thinking. Their answers are recorded in the participant chart. Participants' self-reported levels of training as it pertained to systems thinking ranged from high to low. See Table 3 for individual participant demographic information.

Table 3

*Participant Demographics*

Participant	Position	Gender	Age	Education Experience	Systems Experience
Ms. Levesque	Assistant Superintendent	F	62	40 yrs.	High
Mr. Borden	Principal	M	48	23 yrs.	High
Ms. Luger	Assistant Principal	F	38	12 yrs.	Low
Mr. Kingston	Teacher	M	60	28 yrs.	Low
Ms. Martel	Teacher	F	40	16 yrs.	High
Ms. McMahon	Teacher	F	28	7 yrs.	High
Mr. Bagwell	Teacher	M	30	6 yrs.	Medium
Ms. Banks	Teacher	F	25	2 yrs.	Medium
Ms. Bliss	Teacher	F	27	4 yrs.	High
Mr. Piper	Teacher	M	47	18 yrs.	Medium

This chapter focused on the findings of this research study. As a result of the similarities in responses, findings from this study have been organized into three recurring themes. Three realist tales, followed by general discussion sections are used to report findings from the study (Van Maanen, 2011). Quotes from interviews, as well as quotes taken from my field notes are used in both the tales and discussion sections. The three major themes that emerged from the study are: Building a Culture of Collaboration, Making Sense of Data, and the Importance of Professional Learning.



## **Building a Culture of Collaboration**

Only a few years ago, Mr. Borden was thrust into the role of principal at Flair Middle School after toiling away in his first leadership role in another district school as an assistant principal. He had witnessed school leaders before him struggle with important school decisions and be ridiculed for their results. In his first years as principal, he too, had fought the same battles. It seemed as if every decision he made was second-guessed by faculty and staff and sometimes parents. He suspected that he needed to do a better job of involving others in making decisions for the school but had always felt that making decisions was just part of the job. “I was ok with making decisions in isolation because I didn’t want to be held accountable to something I might not necessarily agree with,” Mr. Borden thought (Interview). He had been told by one of his administrative mentors many times that he needed to find a way to give others a voice if he truly wanted to see meaningful change take place within his school building. After much hesitation and reluctance, Mr. Borden finally gave in to Ms. Levesque’s request that he consider looking into Systems Thinking. According to her, Systems Thinking created an avenue for him to talk about important issues the school faced, the data associated with those issues, and, most importantly, a process by which those tough discussions could be conducted in a non-threatening way. After extensive amounts of professional development and a willingness to try a new way of thinking and conducting school business, Flair Middle School, led by Mr. Borden and his newly formed leadership team embarked a journey to collaborate together to make the best, most informed decisions for the school organization.

On this particular Tuesday, Mr. Borden, the principal of Flair Middle School, loosened his tie and ran his fingers through his hair. It had been a long, but rewarding day. Glancing

down at his notes from the afternoon leadership meeting brought a smile to his face. He stated (Interview),

Just a little over a year and a half ago, we would've met for an hour or so and I would've led the whole meeting without anyone saying a word. But, I was fine with it as long as no one questioned what I wanted to do or why I wanted to do it. I always thought that's the way it was supposed to be done. I was in charge. I just wanted the teachers to rubber-stamp what decisions I made. The problem was that nothing was getting done. The teachers complained and fought against any changes I tried. Looking back, it was a very stressful time. Fast-forward to today and the changes that we have made in how we do things have brought about a level of collaboration that was non-existent before we made the move to using systems thinking. The amount of work we have been able to accomplish recently has really been outstanding. For the first time in my professional administrative career I feel as if I am part of a team that is working together to make this school a better place for our students.

As Mr. Borden got ready to turn off the lights to his office, he took one last look at the series of chart papers on his wall. He beamed with pride as he focused on the various drawings consisting of numbers and letters in different shades of multiple colors. Although some may have viewed the charts as simply attendance data, Mr. Borden claimed it was a visual representation of the progress his school organization had made in working together to make more effective decisions, along with his own personal growth in becoming a more effective school leader.

## **Discussions**

This study focused on two major groups within the school organization at Flair Middle School within the Flair School District. The school's leadership team, as well as other members of the school's administrative staff, were asked questions pertaining to the organization's use of systems thinking in regards to making school decisions. The data collected from the interviews revealed major themes the participants all agreed played a major role in the success or failure of using systems thinking effectively. The first major theme was the key idea of systems thinking building collaboration within the school organization. Seven out of the ten participants referenced the positive impact systems thinking processes had on the increased level of collaboration within the school and throughout the district. Observational data were recorded which included school leadership and various faculty members working together to solve issues related to the school organization. During one of the structured observation portions of the visit to Flair Middle school, the school's leadership team made up of school leadership and select teachers were using systems thinking tools to guide their discussion on issues surrounding student attendance. Chart paper with various behaviors over time was posted around the room with leadership team members moving freely around the room discussing their findings.

Participants expressed that the school's willingness to work together had not always been this way. Research Question 1c stated, "What barriers inhibited the development of systems thinking use in the decision-making processes at Flair Middle School?" One major barrier identified by 8 of the 10 participants dealt with the previous style of leadership used by the principal. According to the 7 teacher participants, the school's principal led more autocratically than democratically. Mr. Borden (Interview), Flair Middle School's principal, stated:

“Before we started this journey (with systems thinking) I was accustomed to making decisions for the school with little to no input. It is kind of how I was taught. I knew, at the end of the day, I was held accountable for the decisions, so why not make them myself.” One participant, Mr. Kingston, a veteran teacher with limited experience with systems thinking, stated (Interview), “Years ago decisions were made and we just all dealt with it. Now, we all sit down and truly look for the reasons why things are happening before decisions are made. I credit systems thinking tools for allowing us to work more closely together. It’s definitely not easy but it sure is worth it.” Mr. Borden, the school’s principal, acknowledged (Interview), “It’s not always easy to share leadership responsibilities and involve others, but using systems thinking has provided a way to make it a lot easier. It has allowed me the ability to include the voice of others, where in years past I would have just made a unilateral decision and moved on. My reluctance to let go probably held us back a little bit in the beginning.” The teachers that I interviewed agreed that the principal’s initial reluctance to share in the decision-making made the transition to using systems thinking more difficult. Once his mindset began to change, and more collaboration began taking place, the process became much easier.

Research Question 1 stated, “What successes are attributed to the use of systems thinking in the decision-making processes at Flair Middle School?” According to every participant, the increased collaboration in the school decision-making process brought on by using system thinking has made for more effective decisions for the organization. It also gave the leadership team members a better understanding of how the school works. Ms. Luger, the school’s assistant principal, discussed some of the changes in how school leadership makes decisions (Interview).

All of our leadership team meetings now have a purpose. Before, we would gather the team together and just have them sign in for documentation purposes. The teachers really

didn't want to be there because they felt like we (school administration) were going to do what we wanted anyway whether they wanted something different or not. Now, we have a process. Everyone has a certain piece of data that they are assigned to bring to the group before each meeting. Typically, we discuss the data using a systems tool such as a behavior over time chart or possibly a causal loop, if it is something we have been working on for a while. What we have found is that we have to have the input of a lot of people if we are going to use systems tools correctly, so it has forced us to utilize our teachers more and involve more people. Our conversations are much deeper. In turn, it has brought about more informed decisions which has worked out to our benefit, as a school.

Five of the participants credited systems thinking with totally changing their mindset on how they view the opinions of others. One item of note from one of the structured observations was the iceberg visual that was visible in the leadership meeting. The leadership team used the iceberg in discussions pertaining to the possible root causes for the school's recent drop in student attendance. As noted in the review of literature, the iceberg model was a systems thinking tool that incorporates other tools and allowed a person or a group to dig deeper to find a root cause to an issue while examining one's own mental model. A majority of the participants reported a significant change in the way they viewed various issues as a result of using the iceberg model. During the leadership meeting the phrase "mental model" was used 12 different times, which signified its importance within the group. The creators of the district's STM included the iceberg model, as well as a section on mental models for use within the schools. The STM listed best practices on how to use the iceberg model and under what conditions.

According to the participants, the increased collaboration built a level of trust within the group that allowed for collective growth, as well as individual growth. Eight of the ten participants reported that at some point during the process they began to realize that each member brought a unique perspective to the group. This changed the group dynamic considerably according to four participants. Mr. Kingston, one of the school's science teachers who served on the school's leadership team, stated (Interview):

I may be the first one to tell you this but when we changed how we were conducting leadership (meetings) most of us were not on the same page. It was all new to us. We had been working in isolation for years it felt like. We each had our own way of doing things and most of us were not willing to change. I'm not sure what the precise catalyst for the change was, but somewhere along the way we changed as a group. We started listening more and talking less as individuals. Personally, I started taking the viewpoints of all of our members into account before I made any recommendations myself. I know the others probably changed as much as I did because meetings became more about the school and less about our personal agendas.

Other participants chose to discuss how systems thinking has increased collaboration in their classrooms and its positive effect on their students' learning. One teacher, Ms. McMahon, stated (Interview):

By seeing the positive aspects of using systems thinking as a member of the school's leadership team, I felt like it would be interesting to see how well my Language Arts students would adjust to using them in class. We have found ways to analyze various pieces of literature using the tools and I feel like my students have a better understanding of what they have read. Seeing my students work together and create has been the

biggest benefit to me. I am so glad I was exposed to this process as I can, now, pass it on to my students.

Mr. Bagwell, also a member of the leadership team and a history teacher at Flair Middle School, had this to say (Interview):

Although it has been great to be a part of the leadership team and use systems thinking to work with (Borden), the best thing that has come out of it is that I can use systems tools with my kids. I enjoy teaching history and have always struggled a little with getting my students to relate things together. Using systems tools in class has given me a way to do that. Although it was difficult on the front end, as far as teaching the specific tools, my kids love it now. Seeing them work together and present their findings using the tools has been nothing short of amazing at times. It has really made me feel good as a teacher.

During one observation period in a 6<sup>th</sup> grade science class, the students worked together and created causal loop diagrams to explain the water cycle on earth. The students were clearly familiar with using this particular systems tool. Communication and collaboration among the student groups were evident throughout the observation period.

According to all ten participants, systems thinking has played a significant role in increasing collaboration and group communication throughout the school. Mr. Borden exclaimed (Interview), “Although it doesn’t make every decision easier, or right, it (systems thinking) has created a new level of understanding among all of us. It has made it easier for us to work together and get on the same page which has led to some good things for our school.”

One common belief held by the majority of the participants was that systems thinking allowed for more voices to be heard. Five of the seven participants mentioned in their interview

that systems thinking provided an avenue for those who are usually quiet to have a voice in the decisions being made. The assistant principal, Ms. Luger stated (Interview):

We have wondered for year how to get more people involved or at least create an avenue for more voices to be heard. Whether it is in the classroom or in the conference room, we need more people to be willing to throw their two cents worth in without feeling out of place. Systems thinking has given us a way of hearing more people in our leadership team. From the few teachers that are using them in the classroom, I am hearing that some students are becoming more engaged in activities that require systems use.

Research Question 3 stated, “What are possibilities of future uses of systems thinking at Flair Middle School? Nine (9) of the 10 participants expressed that the expanded use of systems thinking in the classroom would possibly lead to increased student engagement and student collaboration. The teachers all felt that student engagement was essential to maximizing learning among individual students. The participants that have used systems thinking tools in the classroom reported that their lessons seemed more meaningful because of the level of student engagement. Ms. McMahon exclaimed (Interview), “When I use systems thinking tools with my students, they seem to get it a different level. I want to think that it makes them dig deeper into the information. It makes it kind of fun for them at the same time.” While 7 of the 10 participants made mention that all students should be exposed to using systems thinking and its associated tools, 9 of the 10 participants felt that systems thinking could be useful in all academic subject areas if the teachers were willing to give it a chance. Ms. Bliss stated (Interview), “Systems thinking tools are not just for adults. I feel if teachers used them in the classroom it would go a long way with helping develop creative problem solvers within our students.”



One of the major successes attributed to the use of systems thinking at Flair Middle School is the significant increase in collaboration. Data from interviews suggested that before systems thinking's implementation that school organization members (school leaders and teachers) worked in isolation. Interview data, structured and unstructured observational notes, and the district's STM suggest that collaboration has increased among key school personnel. One barrier to the development of systems thinking use by Flair Middle School was the school principal's autocratic leadership style in previous years. Participants reported that systems thinking did not begin to take hold until the principal relinquished his complete control over the school decision-making process and began to work more closely with other organizational members. One future use that participants would like to see implemented is the expanded use of systems thinking into all classrooms. By utilizing systems thinking, a majority of participants agreed it would possibly increase student engagement and develop critical thinking skills.

### **Making Sense of Data**

Ms. Luger, the assistant principal at Flair Middle School, gathered the necessary folder from the school secretary's desk. "I hope I got it all", she exclaimed (Observation), as she rushed down the hall to the school's conference room. The third Tuesday of each month was set aside for the Flair Middle School leadership team to meet and discuss various items of interest pertaining to the school. The topic for this particular day dealt with school safety. Mr. Borden, the school's principal, had initiated an online survey for students, parents, and teachers to complete which asked questions regarding school safety. Ms. Luger had the survey results tucked neatly in a folder with copies for everyone who was to attend the leadership meeting. As she began dispersing the information packets to team members, Mr. Borden addressed the group. He stated (Observation):

The information you are receiving is the data accumulated from the online survey that we started last month. As you all know, we have had multiple complaints from parents about their kids experiencing bullies in various areas while at school. The idea is for us to look at this together and see how we can make sense of what we are being told. I also included the results from previous surveys from the last two years so we can kind of compare the entire three years of data. So, I guess the question is where do we start?

Mr. Kingston, one of the teacher representatives, responded (Observation), “I feel it is best we break up in groups of two and look at the individual years and then revisit all of the information as a group.” Mr. Bagwell concurred with Mr. Kingston (Observation), “I agree. I believe this is the way we should begin tackling it too. Otherwise, we may get too caught up in discussing just one year in particular. Maybe it’s best if we go ahead and identify some behaviors over time and then when we rotate, each group can add to.” Ms. Martel, another teacher leader, added (Observation), “Let’s just make sure we don’t jump ahead of ourselves as we are looking at this. Let’s simply identify the areas of concern and then discuss as a group so we can best build our possible causal loops.” At that point everyone assembled into smaller groups of two to look through the three years’ worth of data.

## **Discussions**

All participants who took part in the interview process indicated that systems thinking tools gave them a clear process for analyzing data and reporting findings. Research question 1a asked, “What prerequisites, if any, preceded the use of systems thinking in the decision-making process at Flair Middle School?” Nine of the ten participants agreed that there were no established processes for making evidence-based decisions at Flair Middle School. Ms. Luger, the assistant principal, stated (Interview), “We did not have a formal way of looking at data. The

administrative team looked at data together from time and time and made the best decisions we could, based on what we thought we saw.” Mr. Borden, the principal, added (Interview), “I am embarrassed to say that we didn’t look as deeply at the data as we needed to. A large part of the problem is we did not have a process in place to allow us, or me for that matter, a way to look at the data and understand it.” It was quite evident in talking with each participant that before the implementation of systems thinking the school had no organized framework for utilizing data in the school’s decision-making process. The principal produced leadership team agendas and notes from before the implementation of systems thinking and after to show evidence of the changes that had been made. The school district’s Systems Thinking Manual (STM) was also viewed to give me a better understanding of the implementation process used with administrative team members and district teachers for the use of systems thinking. Eight of the ten participants expressed that systems thinking helped them better understand the different types of data that were available for making school decisions. The district’s STM contained very clear guidelines and instructions on how systems thinking tools could be used in conjunction with school data to make decisions. Although the STM did not list mandates for district use, it did provide examples of use that were easily transferrable to various situations within the school. Ms. Martel, one the school’s elective teachers, appreciated having a framework from which to work while looking at the data. She stated (Interview):

I have been a part of my school’s leadership team on and off for the better part of 10 years. I really don’t mind, but up until recently, I was always real disengaged. As teachers we have always been given a bunch of information at the beginning of the school year at the opening faculty meeting, but were never really told what to do with it. It was always just a bunch of numbers on a page. We did the best we could with it but it

always just surface level. We never really dug deep, so to speak. I can honestly say that things are much different now. When Mr. Borden told us we were going to start using a new way of looking at data and discussing our findings together, we all thought it was just another bunch of hogwash. Little did we know that just a few months later we would be attacking problems and have conversations as a group that would carry a lot of weight. I credit systems thinking tools for our turn around. We work together and understand things much better as a result of them. I am much more engaged today than I ever have been.

Other participants echoed sentiments similar to that of Ms. Martel. Mr. Kingston, who has been a science teacher for 28 years, said (Interview):

I have been in this profession for a long time. I felt like I didn't need anyone to show me how to look at data. Granted, I have been looking at standardized test scores for close to 30 years. Little did I know I had much to learn. Although I haven't had as much training as some of the others, because it took me a little longer to come around, I can honestly say that I understand our school a little better as a result of using systems thinking and working with my colleagues in looking at the data. I am starting to enjoy it so much that I am beginning to use some of it in my advanced science classes. It has truly opened my eyes to the different ways we can use data.

Other participants chose to discuss the benefits of having a process such as systems thinking as opposed to how things were done in the past. One teacher, Ms. McMahon stated (Interview):

Using systems thinking and the iceberg has allowed us to dig a little deeper into the data we are looking at. By working with others and having more organization, it has allowed

our leadership group the opportunity to be a little more efficient. I'm not saying that all of our meetings are short but we seem to have a more clear idea of where we are going and what we want to accomplish. Systems thinking has benefited us in the regards of giving us more purpose. And as someone who values time, I appreciate that.

Research Question 2 asked, "How were systems thinking tools used in the evidence-based decision making processes at Flair Middle school?" During my observation periods I was able to see both the school's leadership team and students in the classroom use systems thinking tools. The use of systems thinking and its tools was evident throughout the school. In the leadership meeting room, various charts and graphs were hung with evidence of significant thought being put into the work. Different forms of student achievement data and student demographic data, infused in systems tools, were posted on the walls, as well as the hallways of the school. I observed students in the classroom using systems tools to better understand the concept of the water cycle in science class.

A majority of the participants, eight of ten, believed that systems thinking played a role in helping the group understand the data they were tasked with analyzing. Mr. Borden, the school's principal, said (Interview), "As we started getting more comfortable and efficient using the tools, we began to get a better understanding of the data we were looking at, because we were actually listening to each other and taking into account each other's views. We understood better because it was our collective thoughts as opposed to just the individuals. As we improved we felt like we started making better decisions for the school as a whole."

One teacher, Mr. Bagwell, somewhat disagreed with the group as it pertained to increasing understanding of the data. He was adamant that although systems thinking was a tool

to look at data, it was up to the individual as to whether or not they truly understood the information. He stated (Interview):

I generally disagree with the notion that systems thinking helps everyone understand data better as the others have stated. I don't think it necessarily increases capacity or understanding. If you have a strong personality in the room, that one person can still take over a conversation and force their thoughts on others. If you have people who don't conform to the norms of the group, or if norms have never been established, then you can have some major problems. In order for systems thinking to work as intended, everybody has to be willing to put himself or herself aside and actually listen to others.

When discussing the possibilities of future use of systems thinking, 6 of the 10 participants mentioned that they would like to see systems thinking used in teacher committees outside of the school's leadership team. At the time of this research study, all teachers at Flair Middle School were required to be a part of a particular school committee. Although most of the teachers had received systems thinking training, it was reported that very few were using the tools to make decisions in committee meetings. Mr. Kingston, one of the more veteran teachers, stated (Interview), "I just think most teachers feel it (systems thinking) is for the formal leadership team to use." The participants all agreed any time a big decision is being made for the school that systems thinking tools should be used.

A major success attributed to systems thinking at Flair Middle School is the belief that it was instrumental in helping organizational members better understand the data they were using for their work. Interviews and observational notes helped me determine that there were no established processes in place to look at data for decision-making purposes before the district's systems thinking implementation. Interview data suggested the majority of participants agreed

that systems thinking tools were of benefit when using data to make decisions. By working together and becoming more familiar with the system tools, participants reported increased efficiency and better understanding. Structured observation notes from the school's leadership meeting showed that the group appeared to be familiar and comfortable with the use of system tools on that particular day. Unstructured observation notes collected from classroom observations showed that students were using the tools with some degree of familiarity and comfort. The students' successful presentations of their work with the tools and their observed comfort level were noted. It was evident to me during my time at Flair Middle School that systems thinking and its associated tools had a positive impact on helping school organizational members better understand the data they were using.

### **Importance of Professional Learning**

Ms. Levesque, the assistant superintendent for the Flair School District, barely contained her excitement. This particular day marked the beginning of her school system's annual systems thinking conference for schools. It was an event that began a few years ago with just a few school administrators and teachers in the Flair School District. Now the conference included schools from all over the region, as well as other parts of the country. When Ms. Levesque was hired by the Flair School District six years ago, very few in the district had even heard of systems thinking. She was determined to leave a lasting legacy built on working together with all organizational members to improve schools in the district. Ms. Levesque stated (Interview):

Our goal in the beginning of this was to expose all school leaders to systems thinking theory. From that point they were free to do with it as they pleased. There was no mandated use of systems thinking tools in any of the schools in the district. As our school leaders and teachers learned more about the benefits and became more

comfortable with the use of systems thinking, its use exploded throughout the district. I am so happy that through opportunities of continued professional learning such as this, that systems thinking has taken hold in our school district.

As she rushed through the halls of the local business which had agreed to hold the conference this particular year, she hoped that this year would be a successful learning event for all participants. With two full days of learning ahead, coupled with two world-renowned speakers on systems thinking, Ms. Levesque was expecting the very best. The benefit of using systems thinking was something that she truly believed in. Her district had made such great strides in using the tools for making important decisions for their respective schools. It was now time for their district to share their systems knowledge with their neighbors both near and far. In her eyes, events such as this were vitally important to the continued growth of the professional learning community that she and others had worked so hard to build. Ms. Levesque exclaimed (Interview):

I love my job. I love teaching others about systems and making them aware of how interdependent we all really are. The work going on here today and tomorrow will not only benefit those who are new to our little systems community, it will be also extremely beneficial to those of us who have been using these strategies for years. Continued professional learning is the key. With systems thinking, we have never truly arrived. The world around us is ever changing so we must work together, learn, and continue to grow to find the best solutions possible.

## **Discussions**

The final major theme that arose from the accumulated data was the importance of sustained high quality professional development. Research Question 1b asked, “What facilitated



the development of systems thinking use in the decision-making processes at Flair Middle school?” All ten participants indicated that the professional development offered by the Flair School District has been instrumental in the successful utilization of systems thinking in making school decisions. Each year since the district’s systems thinking initiative began, the Flair School District has hosted an annual systems thinking conference. In its first year, the event was held to introduce systems thinking to its own groups of school leaders. Since that time the event had grown to include school districts throughout the region. During my time with the Flair School District, I observed and, also, engaged in learning during the professional development event. The participants in the event were highly engaged through various activities and learning sessions. Ms. Levesque, who initially introduced the Flair School District to systems thinking, stated (Interview), “When we started this journey, I knew we had to have the very best training for our people. Otherwise, it would not work.” For the initial professional development, the Flair School District brought in a nationally recognized nonprofit organization that specialized in systems thinking to conduct the training. This training resulted in the creation of the district STM. This was important because it laid the groundwork for more organizational members to be trained. At the time of my visits to the Flair Middle School, training and ongoing professional development, which used the STM, were made available to all educators in the school. Participants indicated the important role the STM had on their development in the use of systems thinking. When asked to discuss the STM, Mr. Piper (Interview) had the following to say:

Our district manual has made it easier for me to refer back to specific tools from time to time and kind of freshen up a bit. It’s convenient for me to have my own copy and plus it’s not written like a book per se. It kind of has the feel as if it was written specifically for our teachers in our district, which was kind of nice. I credit our district staff with

having something like this (STM) with us (teachers) in mind. I count it as our own little personal professional development piece.

All participants interviewed praised the significant investment the district made in the systems thinking professional development. Seven of the ten participants credited the quality of professional development and claimed it as a reason for their own personal/professional growth. Ms. Martel, a language arts teacher, stated (Interview):

I didn't know what systems thinking was and really didn't care to begin with. That was, until I realized the value it had. Our district brought in some of the best people in the country to train us. The training was fun and engaging, but most of all it made sense. I enjoy learning more about how to use systems thinking. It has made me a better teacher and mother, as well.

During an unstructured observation of a 6<sup>th</sup> grade science classroom, it was noted that the teacher was working with various students on the proper use of a systems thinking tool. The teacher and students worked together to resolve the questions that were asked using the STM. Mr. Kingston, a science teacher on the leadership team, was very candid. He stated (Interview):

I have been in this profession for over 28 years. I wish I had known about some of this sooner. There have been times when I have made hasty decisions for my classroom and students that I didn't necessarily think through. The professional development and training I have received in systems has brought a new outlook on life for me. I constantly think about the possible consequences of what I am doing at school and at home. I enjoy our training times more now than ever. It has helped me become a better person. I also enjoy teaching systems theory to my kids (students).

Although all teachers have had the opportunity to receive professional development in the use of systems thinking and its associated tools, it was reported by two participants that a few teachers have felt no need to participate in the professional development. Some teachers feel that systems thinking cannot be used in their classroom curriculum and therefore is not useful to them. Ms. Bliss, one of the school's language arts teachers, explained (Interview):

For some reason a few teachers still believe that systems tools cannot be used in their classroom. They believe it is just something the leadership team and principal use to make data boards. I've tried to explain to them that you can use the tools in many different subject areas.

The district's STM clearly shows examples of how systems tools can be used in any classroom setting with proper planning. Other teachers believe the time is right to incorporate more subject specific training related to systems thinking. Ms. Banks, who has only been teaching 2 years, explained (Interview):

I still consider myself a newbie when it comes to systems thinking tools. I have enjoyed the PD that we have received at the school level and all but I am ready to go to the next level. I really wish we would consider subject level PD for using systems thinking in the classroom. I've heard that may be happening in the near future, so I'm real excited.

The final major success which facilitated the development of systems thinking at Flair Middle school was the quality professional learning that came about as a result of the district initiative on system thinking. Interview data suggested that the professional development opportunities coupled with the district's STM have had a positive impact on implementation and systems thinking use. Structured observations from the district's systems thinking conference noted the engagement of the participants in the professional learning process. Unstructured

observations from a Flair Middle School classroom noted the STM being used by teachers and students, alike, to get clarification and gain a better understanding of the use of a particular systems tool. From my view the school leaders and other organizational members of Flair Middle School placed tremendous value on the quality of the professional learning offered to them. The district level professional learning played a major role in the successful implementation process.

### **Conclusion**

In this chapter, I presented the findings of the study. These findings are based on the analysis of interview transcripts, as well as observation data and organizational documents obtained during the study. I organized my findings into three recurring themes, which emerged from the data. The first major section focused on building a culture of collaboration. The second major section focused on making sense of data through the use of systems thinking. The last major section focused on the importance of professional learning as it pertains to systems thinking.

## CHAPTER V. FINDINGS

### **Introduction**

The purpose of this study was to determine how middle school leadership team members at Flair Middle School used systems thinking to make effective evidence-based decisions pertaining to the school organization. This chapter summarizes the study, discusses findings as they relate to literature, and presents surprises and conclusions.

### **Summary of the Study**

This study explores schools' organizational use of systems thinking as a process by which data can be examined holistically. With the increased accountabilities placed on schools, a need for best practices in regards to processes for evidence-based decision-making exists. Is systems thinking an appropriate decision-making framework for school organizations to use in their evidence-based decision-making processes? This study sought to find the answer to the question of whether this is in fact an effective practice for school organizations.

The purpose of this study was to determine how middle school leadership team members at Flair Middle School used systems thinking to make effective evidence-based decisions pertaining to the school organization. Research questions addressed during the study included the following:

1. What successes are attributed to the use of systems thinking in the decision-making processes at Flair Middle School?

- a. What prerequisites, if any, preceded the use of systems thinking in the decision-making processes at Flair Middle School?
  - b. What facilitates the development of systems thinking use in the decision-making processes at Flair Middle School?
  - c. What barriers inhibit the development of systems thinking use in the decision-making processes a Flair Middle School?
2. How are systems thinking tools used in the evidence-based decision making processes at Flair Middle School?
  3. What are the possibilities for future use of systems thinking at Flair Middle School?

### **Review of the Methodology**

This research study was a bounded case study of a Midwestern school that used a specific systems thinking framework within the organization for the purpose of making effective evidence-based decisions. Flair Middle School was a public school serving approximately 800 students in grades six through eight, located in a Midwestern state in the United States. The school's demographic make-up can be broken down as follows: 42% African American, 40% Caucasian, 14% Hispanic, 2% Asian, and 1% Multi-Racial. The school employed 82 faculty and staff, 44 of whom were classroom teachers. The average class size of the school had a ratio of 20 students to every teacher. The school's leadership team made up of the school's administration and four other teacher leaders were chosen as participants in the study. Prospective participants from the school's leadership team received an email invitation from Flair Middle School's principal, Mr. Borden, as well as the assistant superintendent, Ms. Levesque. Purposive (Purposeful) sampling was used in the study as the participants were

relevant to the research question and they have experienced that which the research is attempting to uncover (Patton, 2015).

Data accumulated during the research were coded using structural, theme, and memo codes. A codebook was created based on the identified codes. The codebooks were used by a colleague to code portions of my data to ensure that I was appropriately identifying recurring themes within the data. Warrants and assertions associated with my research questions were created as a result of the thematic coding using the codebooks. The findings of the research were organized by overarching themes as opposed to specific answers to the research questions.

### **Major Findings**

At the conclusion of the study's data collection and analysis, it was evident that the thoughts and views of the school's administration and leadership team were very similar in nature. As a result, the major findings of this study can be reported together.

#### **Building a Culture of Collaboration**

The first major finding discussed pertained to systems thinking helping build a more collaborative culture within the school organization. Research Question 1c asked, "What barriers inhibited the development of systems thinking use in the decision-making processes at Flair Middle School?" Interviews revealed that prior to the adoption of the use of systems thinking, the school's administration and leadership team, made up of teachers from various departments within the school, did not work together to make school decisions. Before implementing systems thinking the organization's decision-making process was very top down in its approach. According to interviews with the school's administration, they did not value the input of teachers and students enough.

Research Question 1 asked, “What successes are attributed to the use of systems thinking in the decision-making processes at Flair Middle school?” With the introduction of systems thinking and the use of its tools, the school’s administration made a concerted effort to involve those teachers who made up the leadership team. According to the teachers interviewed, once they realized their input was wanted and valued, they began to work more closely with the school administration in making decisions. Some teachers also mentioned that once they saw the usefulness of systems thinking they began slowly incorporating its use in the classroom with the desired effect of building more collaboration and engagement among peers.

Research Question 3 asked, “What are the possibilities for future use of systems thinking at Flair Middle school?” The majority of the participants responded by saying there was a need for the expanded use of systems thinking tools in the classrooms throughout the school. Participants felt the school would see an increase in student engagement and student collaboration, as a result of systems thinking tools use.

### **Making Sense of Data**

The second major finding mentioned in the study pertained to making sense of data using systems thinking. The majority of participants claimed that systems thinking helped them understand the school data they were required to comb through on a regular basis. Research Question 1a asked, “What prerequisites, if any, preceded the use of systems thinking in the decision-making processes at Flair Middle School?” The majority of participants agreed that no formal framework for disseminating data was in place before systems thinking at Flair Middle School. The consensus was that school leadership made the decisions based on what they saw in isolation with relatively little input from others within the organization.



Research Question 2 asked, “How were systems thinking tools used in the evidence-based decision making processes at Flair Middle School?” The school administration and teachers, who made up the school’s leadership team, all agreed that systems thinking provided a necessary framework from which the evidence-based decision making process began. The team became more process oriented with a focus of more collaboration among all of the leadership team members in the decision-making process. As the team members became more efficient with their work, they began to more closely examine their own personal beliefs about the data. The conversations began to become more meaningful as participation within the group grew. According to a majority of the participants this led to a greater understanding of the school’s data. Participants also expressed the need in the future for use of systems thinking tools in work completed by various teacher committees.

### **Importance of Professional Learning**

The third and final major finding was the importance of quality professional learning and the role it played on the implementation and subsequent use of systems thinking. Research Question 1b asked, “What facilitated the development of systems thinking use in the decision-making processes at Flair Middle School?” Administrators and teachers, alike, stated that high quality professional learning was essential to the successful implementation of systems thinking within their school district. Each participant mentioned the significant investment in time and money that the school district had given to ensure their organizational members had the very best systems thinking training in the country. The teachers, who were a part of the school leadership team, stated that their perceptions changed toward systems thinking when they saw the level of importance placed on the training. As a result, a majority of the participants expressed that the

high quality professional learning had an ongoing, positive effect on their individual classrooms, as well as their personal life.

### **Findings Related to Literature**

The findings of this study agree with various themes found within the review of literature section within this study. The importance of a collaborative culture in using evidence for making decisions, using a systemic approach to make sense of data, and the importance of professional development were all found within the study's review of literature in various places.

According to the participants of this study, the incorporation of systems thinking for the purpose of analysis of school data/evidence brought about a shift in the established culture of the group. Collaboration among leadership team members at Flair Middle School increased according to the participant interviews in the study. Participants mentioned an increase in professional communication/dialogue that came along with using systems thinking tools. This echoed the findings of Kennedy and Datnow (2010) and Feldman and Tung (2001) who made the claim that evidence based decision-making can lead to increased professional dialogue between organizational members.

Participants mentioned that as the use of the systems thinking tools continued in the school, they realized each member brought a unique perspective of the school to the group. Scully, Kirkpatrick, and Locke (1995) stated that the involvement of various stakeholders created vast benefits when making decisions for organizations. Kowalski (2009) said that school leaders could be more successful in defining problems and finding answers through collaboration. Collaboration brings about the possibility for higher quality decisions within school organization (Tschannen-Moran, 2001).

According to the group of participants, the school organization was able to make better, more effective decisions because of the increase in ownership and collaboration among the group. Senge (1990, 2004) spoke at length about the importance of a shared vision within an organization. Leithwood and Mascall (2008) wrote that by allowing others the opportunity to take part in the decision-making process, it fosters ownership throughout the organization.

Participants in the study discussed that the use of systems thinking enabled them to make sense of and better understand the school data used to make decisions. Seven of the ten participants mentioned that systems thinking provided an organized framework that helped in managing the work. Both Bernhardt (2004) and Senge (1990, 2004) suggested the use of a systemic approach to analyzing data/evidence. 9 of the 10 participants agreed that systems thinking played a role in increasing understanding of the issues that faced the school organization. Bernhardt (2004) stated that by taking a systemic approach and analyzing data, it helps school leaders better understand the school organization. Better understanding can possibly lead to better-informed decisions. Kowalski (2009) stated that by using systemic evidence-based practices, school leaders could be more successful in accurately identifying problems and appropriate possible solutions.

One last major theme found in the study is the importance of high quality professional development relating to the use of systems thinking for school decision-making purposes. The participants in the study made note of the extensive professional development that had been offered to many administrators and teachers throughout the district regarding the use of systems thinking in their respective schools. Most participants declared that the professional development offered was instrumental in bringing about the cultural change of the school. Burt and Reeves (2006) concluded that in order for leaders to make effective decisions using evidence

that they must learn certain skills. The requisite skills to effectively use systems thinking were something that had to be developed over time. Kensler et al. (2012) stated, “The skills related to using multiple forms of data, seeing their interrelatedness and interdependencies, and transforming practice based on evidence are not developed quickly” (p. 50).

The classroom teachers who made up a portion of the school’s leadership team were not as comfortable as the school’s administrative staff in the beginning with using systems thinking. Park and Datnow (2009) found that in many cases classroom teachers had not had sufficient training in using data to make evidence-based decisions. Park and Datnow (2009) made the suggestion that classroom teachers, as well as school administration, should be active participants in professional development on how make better evidence-based decisions. As the professional training offerings increased for the participants in the study, so did their comfort level. This led to better-informed decisions and, in the personal perceptions of the participants, more effective evidence-based decisions.

### **Surprises**

There were a few surprises that I did not anticipate coming into my study. The surprises I encountered included the number of teachers willing/not willing to talk with me about systems thinking use outside of the initial leadership team and the perceived lack of communication between other schools in the district as it pertained to their use of systems thinking.

The first surprise that I did not anticipate was the number of teachers who changed their minds about talking to me regarding the school’s use of systems thinking for decision-making purposes. I was given access to the entire school upon my arrival at Flair Middle School. The school’s principal, as well as assistant principal, had been more than helpful in setting up interviews with teachers, both on the leadership team and some who had rotated off. Before

certain scheduled interviews, multiple prospective participants declined the interview citing class issues that needed to be attended to. This disappointed me to a certain extent because it narrowed my participant pool significantly.

The second surprise involved the perceived lack of communication between schools in the district and how they used systems thinking to make decisions in their respective schools. With the amount of district level professional development that had been offered and completed by the participants, I assumed that schools had discussed their individual implementations of systems thinking in their schools. I expected some answers to interviews questions to reveal communication and collaboration on this topic at the district level. Outside of the district level administrator, very little was mentioned pertaining to other district schools and systems thinking.

### **Implications for Practice**

There are three implications for practice to consider when determining whether or not to use systems thinking in making important school decisions. The following are the conclusions I reached during my time at Flair Middle School, as a result of my interviews with school administration and teacher leaders, along with observations from within the organization.

The first implication is that in order for systems thinking to be most beneficial to the organization, it is ideal that a culture of collaboration exists with democratic leadership structures in place. By collaborating with others, it allows participants to examine their mental models and to possibly make changes to their deeply held assumptions about how the world works. Democratic leadership principles allow others to have a voice in the decision-making processes of the organization. Being an active participant is necessary in successfully implementing the systems thinking process.

The second implication is that high quality professional development is essential to fully implementing the system thinking process. Using systems thinking tools is very process-based. In order to develop capacity an organization must invest in its people and provide the necessary training to gain the maximum benefit. Most importantly, the training and professional learning must be ongoing.

The third implication requires that participants use the system thinking tools regularly. Without using the tools repeatedly, participants cannot expect to improve. School organizations must find ways to examine systems thinking tool uses and determine successes and other areas for opportunity. The organization and participants cannot be afraid of failures. Identifying those failures will lead to opportunities for continued organizational growth.

### **Recommendations for Further Research**

There are a three recommendations for further research as it relates to my study. My first recommendation would be to replicate this study in other school systems using systems thinking as a process for school decision-making. The second recommendation I would make would be to study systems thinking's use in the regular classroom and its perceived effects on student learning. The third recommendation would be to conduct a study on the depth to which schools use systems thinking tools to process school data.

The first recommendation for further research would be to replicate this study in other school districts that use systems thinking for the purpose of making school decisions. This study was unique in that it was conducted in a specific school with a specific set of circumstances. Each school has their own unique situation, so it is assumed there would be some differences.

The second recommendation for further research would be to conduct a study on the perceived effects of systems thinking on student learning in the regular classroom. In this age of

educational accountability, it would be interesting to see data from schools and individual classrooms that use systems thinking in different subject areas. If schools are using these processes in the classroom and academic success is being attained, I think it is a study worth considering.

The third recommendation for further research would be to conduct a study on the depth to which schools use systems thinking tools to process school data. In my study, the participants rarely made mention of the specific tools the organization used to make sense of the data. I think it would be interesting to see what specific tools organizations use and the degree to which they use them for understanding school data.

### **Conclusion**

This study gave me an opportunity to look closely at a school that was using systems thinking in the decision-making process in order to make the best decisions possible for the organization. My initial conceptual framework for this study included the ideas that specific decision-making processes, distributed leadership styles, and specific types of school data worked together to help school organizations make effective evidence-based decisions. Throughout my study, the themes that kept coming back to the forefront were 1) Collaboration is important, 2) Systems thinking helps participants better understand data, and 3) High quality professional learning is a key to success. While revisiting my initial conceptual framework for the study, I found one major difference in the case of this particular middle school. I have included an updated version of my conceptual framework below.



*Figure 5. New Conceptual Framework*

The participants in my study placed great emphasis of the impact of the high quality professional development they received on the use of systems thinking. According to the participants, the professional learning associated with systems thinking led to an increased use of systems thinking, as well as played a role in the change of leadership style within the school. The high quality professional development offered by the district and school had a significant impact on developing capacity for the use of systems thinking within the organization. This intrinsic case study of a middle school's use of systems thinking to make decisions adds to the growing literature of systems thinking's use in schools.



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APPENDIX A  
AUBURN UNIVERSITY INSTITUTIONAL REVIEW BOARD (IRB)  
CONSENT AND APPROVAL

## REQUEST for PROJECT RENEWAL

For information or help completing this form, contact: **THE OFFICE OF RESEARCH COMPLIANCE (ORC)**, 115 Ramsay Hall  
 Phone: 334-844-5966 e-mail: IRBAdmin@auburn.edu Web Address: http://www.auburn.edu/research/vpriohs/index.htm

Revised 2/1/2014 Submit completed form to [IRBsubmit@auburn.edu](mailto:IRBsubmit@auburn.edu) or 115 Ramsay Hall, Auburn University 36849.

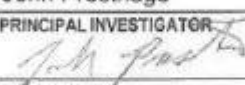
**Exempt Activities:** Must be renewed at least every 3 years.

**Expedited and Full Board Protocols:** Must be renewed at least annually, prior to the expiration date of the protocol.

If you do not plan to collect additional data and/or you do not have access to identifiable data (code lists, etc.), you may be able to file a "FINAL REPORT" for this project. Contact the ORC for more information.

Form must be populated using Adobe Acrobat / Pro 9 or greater standalone program (do not fill out in browser). Hand written forms will not be accepted.

1. Protocol Number: 12-362 EX1211
2. Original IRB Approval Dates: From: 11/12/12 To: 11/11/15
3. Requested Renewal Period (ONE YEAR MAXIMUM): From: 11/12/16 To: 11/11/16
4. PROJECT TITLE: Dissertation: The Use of Systems Thinking Tools in Ritenour Schools

5. <u>John Prestridge</u> PRINCIPAL INVESTIGATOR	<u>Student</u> TITLE	<u>EDLD</u> DEPT	<u>256-783-3094</u> PHONE	<u>prestjw@auburn.edu</u> AU E-MAIL
	<u>2905 Edgemont Street Opelika, AL 36804</u>			<u>Jprestridge@pelham.edu</u>
<u>Lisa Kensler</u> FACULTY ADVISOR	<u>Lisa A. W. Kensler</u> SIGNATURE	<u>EDLD</u> DEPT	<u>334-246-1312</u> PHONE	<u>lak0008@auburn.edu</u> AU E-MAIL
Name of Current Department Head: <u>Sherida Downer</u>				AU E-MAIL: <u>downsh@auburn.edu</u>

6. Current External Funding Agency and Grant number: n/a
7. a. List any contractors, sub-contractors, other entities associated with this project: n/a
- b. List any other IRBs associated with this project: n/a
8. Explain why you are requesting additional time to complete this research project.

Fellow student researcher, Todd Haynie, is using the data collected from this study to complete his dissertation. Mr. Haynie was included on the initial Research Protocol Review Form which was approved on 11/12/12.

FOR ORC OFFICE USE ONLY			
DATE RECEIVED IN ORC:	by _____	RENEWAL # _____	<div style="border: 2px solid black; padding: 5px;">                     The Auburn University Institutional Review Board has approved this document for use from  <u>11/06/15</u> to <u>11/11/18</u>                      Protocol # <u>12-362 EX 1211</u> </div>
DATE OF IRB REVIEW:	by _____	PROTOCOL APPROVAL DATE _____	
DATE OF IRB APPROVAL:	by _____	INTERVAL FOR C _____	
COMMENTS:			

9. **Briefly list (numbered or bulleted) the adverse events occurred over the past year, particularly those that involved participants.**

Over the past year, student researcher, Todd Haynie has used the data collected from the IRB approved research to progress toward finishing his dissertation.

10. **Do you plan to make any changes in your protocol if the renewal request is approved?**

(e.g., research design, methodology, participant characteristics, authorized number of participants, etc.)

NO  YES

(If "yes", please complete and attach a "REQUEST for PROTOCOL MODIFICATION" form.)

11. **PARTICIPANT INFORMATION**

- a. How many individuals have actually participated in this research? 15  
If retrospective, how many files or records were accessed? 0

- b. Were there any adverse events, unexpected difficulties or unexpected benefits with the approved procedures?

NO  YES

If YES, please describe.

- d. How many participants have withdrawn from the study? 0  NA  
If participants withdrew from the study, please explain.

- e. How many new participants do you plan to recruit during the renewal period? 0  NA

- f. During the renewal period, will you re-contact any individual that has already participated in your research project?

NO  YES  NA

If "YES", please explain reasons for re-contacting participants. (If "YES" and the procedure to re-contact has not been previously approved, please complete and attach a "REQUEST for PROTOCOL MODIFICATION" form.)

a. Is the data being collected, stored and protected as previously approved by the IRB?

NO

YES

If NO, please explain.

b. Are there any changes in the "key research personnel" that have access to participants or data?

Attach CITI completion reports for all new key personnel.

NO

YES

If YES, please identify each individual and explain the reason(s) for each change.

Although no changes in key personnel were made - The same personnel on the original IRB protocol remain the same - the principal investigator, John Prestridge has graduated. Todd Haynie will continue analyzing the data for his dissertation purposes.

c. What is the latest date (month and year) you now expect all identifiable data to be destroyed?

(Identifiable data includes videotapes, photographs, code lists, etc.)

DATE: 11/11/16

Not Applicable - no identifiable data has been or will be collected.

1. Attach a copy of all "stamped" IRB-approved documents used during the previous year.

(Information letters, Informed Consents, Parental Permissions, flyers etc.).

No data was collected in the previous year.

2. If you plan to recruit participants, or collect human subject data during the renewal period, attach a new copy of the consent document, information letter, or any flyers you will use during the extension.

(Be sure to review the ORC website for current consent document guidelines and updated contact information:

<http://www.auburn.edu/research/vprohs/sample.htm>.)

**AUBURN UNIVERSITY INSTITUTIONAL REVIEW BOARD For RESEARCH INVOLVING HUMAN SUBJECTS  
RESEARCH PROTOCOL REVIEW FORM**

For information or help contact THE OFFICE OF RESEARCH COMPLIANCE, 115 Ramsay Hall, Auburn University  
Phone: 334-844-5966 e-mail: hsubject@auburn.edu Web Address: http://www.auburn.edu/research/vpr/ohs/

Revised 03.26.11 – DO NOT STAPLE, CLIP TOGETHER ONLY.

Save a Copy

1. PROPOSED START DATE of STUDY: Jan 7, 2013

PROPOSED REVIEW CATEGORY (Check one):  FULL BOARD       EXPEDITED       EXEMPT

2. PROJECT TITLE: Dissertation: The Use of Systems Thinking Tools in Ritenour Schools

3. John Prestridge      Student      Educ. Leadership      256 783 3094      prestjw@auburn.edu  
**PRINCIPAL INVESTIGATOR**      **TITLE**      **DEPT**      **PHONE**      **AU E-MAIL**

2905 Edgemont Street, Opelika AL, 36804      NA      prestridge.john@lee.k12.al.us  
**MAILING ADDRESS**      **FAX**      **ALTERNATE E-MAIL**

4. SOURCE OF FUNDING SUPPORT:  Not Applicable     Internal     External Agency: \_\_\_\_\_     Pending     Received

5. LIST ANY CONTRACTORS, SUB-CONTRACTORS, OTHER ENTITIES OR IRBs ASSOCIATED WITH THIS PROJECT:  
 NA

6. GENERAL RESEARCH PROJECT CHARACTERISTICS

6A. Mandatory CITI Training	6B. Research Methodology
<p>Names of key personnel who have completed CITI:                      John Prestridge ✓</p> <hr/> <p>CITI group completed for this study:  <input checked="" type="checkbox"/> Social/Behavioral    <input type="checkbox"/> Biomedical</p> <p align="center"><b>PLEASE ATTACH TO HARD COPY ALL                      CITI CERTIFICATES FOR EACH KEY                      PERSONNEL</b></p>	<p>Please check all descriptors that best apply to the research methodology.</p> <p>Data Source(s):    <input checked="" type="checkbox"/> New Data      <input type="checkbox"/> Existing Data</p> <p>Will recorded data directly or indirectly identify participants?                      Yes      <input checked="" type="checkbox"/> No</p> <p>Data collection will involve the use of:  <input checked="" type="checkbox"/> Interview / Observation  <input type="checkbox"/> Physical / Physiological Measures or Specimens (see Section 6D)  <input type="checkbox"/> Surveys / Questionnaires  <input type="checkbox"/> Internet / Electronic  <input checked="" type="checkbox"/> Audio / Video / Photos  <input type="checkbox"/> Private records or files</p>
6C. Participant Information	6D. Risks to Participants
<p>Please check all descriptors that apply to the participant population.</p> <p><input checked="" type="checkbox"/> Males    <input checked="" type="checkbox"/> Females    <input type="checkbox"/> AU students</p> <p>Vulnerable Populations  <input type="checkbox"/> Pregnant Women/Fetuses    <input type="checkbox"/> Prisoners  <input type="checkbox"/> Children and/or Adolescents (under age 19 in AL)</p> <p>Persons with:  <input type="checkbox"/> Economic Disadvantages    <input type="checkbox"/> Physical Disabilities  <input type="checkbox"/> Educational Disadvantages    <input type="checkbox"/> Intellectual Disabilities</p> <p>Do you plan to compensate your participants?    Yes <input type="checkbox"/> No <input checked="" type="checkbox"/></p>	<p>Please identify all risks that participants might encounter in this research.</p> <p><input checked="" type="checkbox"/> Breach of Confidentiality*    <input type="checkbox"/> Coercion  <input type="checkbox"/> Deception    <input type="checkbox"/> Physical  <input type="checkbox"/> Psychological    <input type="checkbox"/> Social  <input type="checkbox"/> None    <input type="checkbox"/> Other</p> <p align="center">Received  <span style="color: red;">OCT 30 2012</span></p> <p><small>*Note that if the investigator is using or accessing confidential or identifiable data, breach of confidentiality is always a risk.</small></p>
<p>Do you need IBC Approval for this study? <input checked="" type="checkbox"/> No    <input type="checkbox"/> Yes - BUA # _____    Expiration date _____</p>	

The Auburn University Institutional Review Board has approved this document for use from 11/12/12 to 11/11/15  
 Protocol # 12-362 EX 1211

**FOR OHSR OFFICE USE ONLY**

DATE RECEIVED IN OHSR: 10/30/12 by GP    PROTOCOL # 12-362 EX 1211  
 DATE OF IRB REVIEW: 11/12/12 by CC    APPROVAL CATEGORY: 45 C.F.R. 46.101(b)(2)  
 DATE OF IRB APPROVAL: 11/12/12 by CC    INTERVAL FOR CONTINUING REVIEW: 3 years

COMMENTS: reprinted consent received 1/15/13



**7. PROJECT ASSURANCES**

**PROJECT TITLE:** Dissertation: The Use of Systems Thinking Tools in Ritenour Schools

**A. PRINCIPAL INVESTIGATOR'S ASSURANCES**

1. I certify that all information provided in this application is complete and correct.
2. I understand that, as Principal Investigator, I have ultimate responsibility for the conduct of this study, the ethical performance this project, the protection of the rights and welfare of human subjects, and strict adherence to any stipulations imposed by the Auburn University IRB.
3. I certify that all individuals involved with the conduct of this project are qualified to carry out their specified roles and responsibilities and are in compliance with Auburn University policies regarding the collection and analysis of the research data.
4. I agree to comply with all Auburn policies and procedures, as well as with all applicable federal, state, and local laws regarding the protection of human subjects, including, but not limited to the following:
  - a. Conducting the project by qualified personnel according to the approved protocol
  - b. Implementing no changes in the approved protocol or consent form without prior approval from the Office of Human Subjects Research
  - c. Obtaining the legally effective informed consent from each participant or their legally responsible representative prior to their participation in this project using only the currently approved, stamped consent form
  - d. Promptly reporting significant adverse events and/or effects to the Office of Human Subjects Research in writing within 5 working days of the occurrence.
5. If I will be unavailable to direct this research personally, I will arrange for a co-investigator to assume direct responsibility in my absence. This person has been named as co-investigator in this application, or I will advise OHSR, by letter, in advance of such arrangements.
6. I agree to conduct this study only during the period approved by the Auburn University IRB.
7. I will prepare and submit a renewal request and supply all supporting documents to the Office of Human Subjects Research before the approval period has expired if it is necessary to continue the research project beyond the time period approved by the Auburn University IRB.
8. I will prepare and submit a final report upon completion of this research project.

My signature indicates that I have read, understand and agree to conduct this research project in accordance with the assurances listed above.

John Prestridge

Printed name of Principal Investigator

  
Principal Investigator's Signature  
(SIGN IN BLUE INK ONLY)

Oct 8, 2012

Date

**B. FACULTY ADVISOR/SPONSOR'S ASSURANCES**

1. By my signature as faculty advisor/sponsor on this research application, I certify that the student or guest investigator is knowledgeable about the regulations and policies governing research with human subjects and has sufficient training and experience to conduct this particular study in accord with the approved protocol.
2. I certify that the project will be performed by qualified personnel according to the approved protocol using conventional or experimental methodology.
3. I agree to meet with the investigator on a regular basis to monitor study progress.
4. Should problems arise during the course of the study, I agree to be available, personally, to supervise the investigator in solving them.
5. I assure that the investigator will promptly report significant adverse events and/or effects to the OHSR in writing within 5 working days of the occurrence.
6. If I will be unavailable, I will arrange for an alternate faculty sponsor to assume responsibility during my absence, and I will advise the OHSR by letter of such arrangements. If the investigator is unable to fulfill requirements for submission of renewals, modifications or the final report, I will assume that responsibility.
7. I have read the protocol submitted for this project for content, clarity, and methodology

Lisa Kensler

Printed name of Faculty Advisor / Sponsor

  
Signature (SIGN IN BLUE INK ONLY)

Oct 22, 2012

Date

**C. DEPARTMENT HEAD'S ASSURANCE**

By my signature as department head, I certify that I will cooperate with the administration in the application and enforcement of all Auburn University policies and procedures, as well as all applicable federal, state, and local laws regarding the protection and ethical treatment of human participants by researchers in my department.

Sherida Downer

Printed name of Department Head

  
Signature (SIGN IN BLUE INK ONLY)

10/23/12

Date

**8. PROJECT OVERVIEW: Prepare an abstract that includes:**

(400 word maximum, in language understandable to someone who is not familiar with your area of study):

**I.) A summary of relevant research findings leading to this research proposal:**

(Cite sources; include a "Reference List" as Appendix A.)

**II.) A brief description of the methodology,**

**III.) Expected and/or possible outcomes, and,**

**IV.) A statement regarding the potential significance of this research project.**

I.) Perhaps today more than ever, a greater emphasis is being placed on how educational leaders initiate change within an organization for school improvement. Many scholars agree that school improvement takes place and is sustained through a team like approach. Meirinka, Imants, Meijer, and Verloop (2010) stated as much when they wrote "fostering teams which exchange ideas, discuss their experiences and their underlying assumptions and which aim to solve shared problems may be regarded as a promising direction for initiatives aimed at teacher professional development with respect to educational innovation" (p.177). Systems thinking tools provide a catalyst for which the goals of professional learning communities can be accomplished. The combination of being able to determine true causation along with the ability to allow data to drive the decision making process is quite powerful.

II.) The site came about as a result of a connection between the Chair of my study, Dr. Lisa Kensler, and the Assistant Superintendent of Curriculum for Ritenour Schools, Mary Scheetz. Mary also serves as a representative for the Waters Foundation, a leading organization in systems thinking theory and application. Mary arranged for the study to take place with teachers and administrators during a four-day span in January of 2013. Throughout the process, I will keep correspondence with Mary via email, face-to-face meetings, and phone conversations. After several conversations, Mary understands the type of sampling that is needed, and has arranged for me to interview teachers and the leadership team in Ritenour Schools. Participants will complete consent forms. The interviews will consist of open-ended and closed-ended interview questions over a four-day period. Interviews will be tape recorded, and later transcribed using a USB foot pedal, which allows me to control the speed of the audio when playing the tape back. Interviews will be transcribed for coding purposes. Copies of the tapes will be kept locked in a safe, and files of the transcribed data will be kept on my laptop, as well as an external hard drive.

III.) I expect participants to report on the different ways that systems thinking tools can be used for school improvement. I also expect that any participant that does not see systems thinking tools as an asset to school improvement will describe why this is so.

IV.) The purpose of this study is to look at how systems thinking tools could be utilized for the purpose of school improvement. In doing so, the study helps to begin to fill a massive gap in the lack of research tying systems thinking tools to evidence based decision making for the purpose of school improvement. At the same time, this study will test ideas and research already in place, which emphasizes the importance of using evidence-based decision-making techniques. It is a study based on topics, which are grounded in research, but yet to have really been explored. The implications of this study and other future studies related to systems thinking and concepts can have a profound impact on the policies and procedures practiced in schools. It is also important to note that this study examined the ways that teachers implement systems thinking tools into their instruction as well. For this reason, the door is open for future research in to ways that information is transmitted to students of teachers who utilize systems thinking tools in the classroom.

**9. PURPOSE.**

**a. Clearly state all of the objectives, goals, or aims of this project.**

The purpose of this study is to identify ways in which systems thinking tools are being utilized for the purpose of school improvement in Ritenour Schools.

**b. How will the results of this project be used? (e.g., Presentation? Publication? Thesis? Dissertation?)**

Dissertation  
publications  
professional presentations

10a. KEY PERSONNEL. Describe responsibilities. Include information on research training or certifications related to this project. CITI is required. Be as specific as possible. (Attach extra page if needed.) *All non AU-affiliated key personnel must attach CITI certificates of completion.*

John Prestridge ✓  
 Principle Investigator \_\_\_\_\_ Title: Student \_\_\_\_\_ E-mail address: prestjw@auburn.edu  
 Dept / Affiliation: EFLT \_\_\_\_\_

Roles / Responsibilities:  
 Design Study, Conduct Interviews, Transcribe and Analyze Data, Report Results

Lisa Kensler ✓  
 Individual: \_\_\_\_\_ Title: Chair \_\_\_\_\_ E-mail address: lak008@auburn.edu  
 Dept / Affiliation: EFLT \_\_\_\_\_

Roles / Responsibilities:  
 The faculty advisor will oversee the advising of the project, assistance with data collection, analysis, and reporting of findings

Todd Haynie ✓  
 Individual: \_\_\_\_\_ Title: Student \_\_\_\_\_ E-mail address: gth003@auburn.edu  
 Dept / Affiliation: EFLT \_\_\_\_\_

Roles / Responsibilities:  
 Design Study, Conduct Interviews, Transcribe and analyze data, report results

Carey Andrzejewski ✓  
 Individual: \_\_\_\_\_ Title: Comm. member \_\_\_\_\_ E-mail address: cea0011@auburn.edu  
 Dept / Affiliation: EFLT \_\_\_\_\_

Roles / Responsibilities:  
 Advising of the project, assistance with data collection, analysis, and reporting of findings

Lynne Patrick ✓  
 Individual: \_\_\_\_\_ Title: Comm. member \_\_\_\_\_ E-mail address: rlp0004@auburn.edu  
 Dept / Affiliation: EFLT \_\_\_\_\_

Roles / Responsibilities:  
 Advising of the project, assistance with data collection, analysis, and reporting of findings

Individual: \_\_\_\_\_ Title: \_\_\_\_\_ E-mail address: \_\_\_\_\_  
 Dept / Affiliation: \_\_\_\_\_

Roles / Responsibilities:

11. LOCATION OF RESEARCH. List all locations where data collection will take place. (School systems, organizations, businesses, buildings and room numbers, servers for web surveys, etc.) Be as specific as possible. Attach permission letters in Appendix E.

*(See sample letters at <http://www.auburn.edu/research/protocols/sample.htm>)*  
 Ritenour School District, Spring 2013. Mary Scheetz, Assistant Superintendent, Ritenour School District has been contacted and has given permission for the research to be conducted with school personnel.



13. 12. PARTICIPANTS.

a. Describe the participant population you have chosen for this project.

Check here if there is existing data; describe the population from whom data was collected & include the # of data files.  
Teachers and members of the leadership team within the Ritenour School district

participants

withdraw

b. Describe why is this participant population is appropriate for inclusion in this research project. (Include criteria for selection.)  
All participants will have had experience in utilizing systems thinking tools for the purpose of school improvement.

b

c. Describe, step-by-step, all procedures you will use to recruit participants. Include in *Appendix B* a copy of all e-mails, flyers, advertisements, recruiting scripts, invitations, etc., that will be used to invite people to participate.  
(See sample documents at <http://www.auburn.edu/research/principals/sample.htm>)

I have spoken with Mary Scheetz, Assistant Superintendent of Curriculum for the Ritenour School district.

Mary contacted the principals to obtain permission for me to interview teachers and members of the leadership teams.

The principal will be forwarding an email (attached in appendix B) from me as an invitation to participate.

Consent letters will be delivered to those who agree to participate. They will be informed that they can withdraw from the process at any time.

is will

What is the minimum number of participants you need to validate the study? <sup>1</sup> \_\_\_\_\_

Is there a limit on the number of participants you will recruit?  No  Yes - the number is \_\_\_\_\_

Is there a limit on the number of participants you will include in the study?  No  Yes - the number is <sup>100</sup> \_\_\_\_\_

d. Describe the type, amount and method of compensation and/or incentives for participants.

(If no compensation will be given, check here .)

Select the type of compensation:  Monetary  Incentives  
 Raffle or Drawing incentive (Include the chances of winning.)  
 Extra Credit (State the value)  
 Other

Description:

5

6

- 13c. List all data collection instruments used in this project, in the order they appear in Appendix C.  
(e.g., surveys and questionnaires in the format that will be presented to participants, educational tests, data collection sheets, interview questions, audio/video taping methods etc.)
- ✓ Interview Questions: See Appendix C.
  - Audio Recorder

- d. Data analysis: Explain how the data will be analyzed.  
Interviews will be analyzed using computer software.

14. RISKS & DISCOMFORTS: List and describe all of the risks that participants might encounter in this research. *If you are using deception in this study, please justify the use of deception and be sure to attach a copy of the debriefing form you plan to use in Appendix D.* (Examples of possible risks are in section #6D on page 1.)

There should be no discomforts encountered by participants because they can withdraw at any time.

17. PROTECTION OF DATA.

- a. Will data be collected as anonymous?  Yes  No *If "YES", skip to part "g".*  
*("Anonymous" means that you will not collect any identifiable data.)*
- b. Will data be collected as confidential?  Yes  No  
*("Confidential" means that you will collect and protect identifiable data.)*
- c. If data are collected as confidential, will the participants' data be coded or linked to identifying information?  
 Yes (If so, describe how linked.)  No  
We will not code participants. All data will be confidential.

- d. Justify your need to code participants' data or link the data with identifying information.  
Not Applicable

- e. Where will code lists be stored? (Building, room number?)  
Not Applicable

- f. Will data collected as "confidential" be recorded and analyzed as "anonymous"?  Yes  No  
*(If you will maintain identifiable data, protections should have been described in #15.)*

- g. Describe how and where the data will be stored (e.g., hard copy, audio cassette, electronic data, etc.), and how the location where data is stored will be secured in your absence. For electronic data, describe security. If applicable, state specifically where any IRB-approved and participant-signed consent documents will be kept on campus for 3 years after the study ends.

Data will be saved as an mp3 file, on a password protected computer, in a locked room. Hard copies of data will be kept in a locked filing cabinet, in a locked room. The computer will always be kept in a locked house with alarm system. All files will be deleted no later than May, 2014.

- h. Who will have access to participants' data?  
*(The faculty advisor should have full access and be able to produce the data in the case of a federal or institutional audit.)*  
investigators and the faculty advisor

- i. When is the latest date that confidential data will be retained? (Check here if only anonymous data will be retained. )  
May, 2014

- j. How will the confidential data be destroyed? (NOTE: Data recorded and analyzed as "anonymous" may be retained indefinitely.)  
Files will be deleted

**INFORMATION LETTER  
FOR A RESEARCH STUDY ENTITLED**

**The use of Systems Thinking Tools for the Purpose of School Improvement**

**(NOTE: DO NOT AGREE TO PARTICIPATE UNLESS AN IRB APPROVAL  
STAMP WITH CURRENT DATES HAS BEEN APPLIED TO THIS DOCUMENT.)**

You are invited to participate in research study about how systems thinking tools can be utilized for the purpose of school improvement. John Prestridge and Gregory Haynie are conducting this study, under the direction of Dr. Lisa Kensler, Professor in the Auburn University Department of Educational Foundations, Leadership, and Technology. You were selected as a possible participant because of your role and experience with systems thinking tools.

What will be involved if you participate? If you decide to participate in this research study, you will be interviewed. The interview will not last longer than one hour and will be audio taped. No names of participants or locations will be identified in the recordings. The audio recording will be kept on a secure, password protected computer. All audio files will be deleted no later than May 1, 2015.

There will be no risk or discomforts associated with this research. If you participate in this study, you can expect to identify the possible role systems thinking may play in school improvement.

There will be no cost or expenses if you choose to participate in this research. If you change your mind about participating, you can withdraw at any time during the study. Your participation is completely voluntary. If you choose to withdraw, your data can be withdrawn as long as it is identifiable. Your decision about whether or not to participate or to stop participating will not jeopardize your future relations with Auburn University, or your respective institution, school, or department.

Any data obtained in connection with this study will remain confidential. Information collected through your participation may be used to fulfill an educational requirement, published in a professional journal, and/or presented at a professional meeting.

Page 1 of 2

If you have questions about this study, please email me at [prestjw@auburn.edu](mailto:prestjw@auburn.edu). You may also contact my advisor, Dr. Lisa Kensler at [lk0008@auburn.edu](mailto:lk0008@auburn.edu).

If you have questions about rights as a research participant, you can contact the Auburn University Office of Human Subjects Research or the Institutional Review Board by phone (334) 844-5966 or email at [hsubject@auburn.edu](mailto:hsubject@auburn.edu) or [IRBChair@auburn.edu](mailto:IRBChair@auburn.edu).

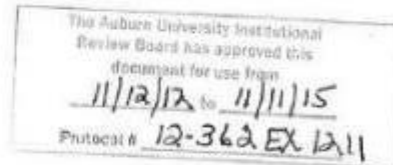
HAVING READ THE INFORMATION PROVIDED, YOU MUST DECIDE IF YOU WANT TO PARTICIPATE IN THIS RESEARCH PROJECT. YOUR SIGNATURE INDICATES YOUR WILLINGNESS TO PARTICIPATE. A COPY OF THIS LETTER IS YOURS TO KEEP FOR YOUR RECORDS.

\_\_\_\_\_  
Participant Name                                  Date

\_\_\_\_\_  
Print Name

\_\_\_\_\_  
Investigator's signature                          Date

\_\_\_\_\_  
Printed Name



## APPENDIX B

### EMAIL INVITATION FOR STUDY

I am a graduate student in the Department of educational Foundations of Leadership and Technology at Auburn University. I would like to invite you to participate in my research study to assess the effects of systems thinking on making school decisions. You may participate if you are a member of the faculty or staff in the Ritenour School District.

As a participant, you will be asked to participate in a semi-structured interview, lasting approximately 40 minutes. If you agree to participate, you may withdraw at any time.

If you would like to participate in this research study, please respond to the email from your principal, letting him know. Participation is strictly voluntary. If you have any questions, please contact me at [gth0003@auburn.edu](mailto:gth0003@auburn.edu) or you may contact my advisor, Dr. Lisa Kensler, at [lak0008@auburn.edu](mailto:lak0008@auburn.edu).

Thank you for your consideration,  
G. Todd Haynie

## APPENDIX C

### CODEBOOK

Major Theme	Code	Sub Theme	Definition	Sample Quotes (Exemplars)
1. Collaboration	COL	Teamwork	Examples of working together	“Once we started using this process, it made it much easier to work together.”
		Tools	Items used in the work	“The systems tools allowed us the opportunity to make decisions together. Whereas before, it’s much more difficult with this group.”
2. Data	DA	Types	Examples of types of data used	“We use all different types of data. Recently we looked at Math benchmark exams to see what standards were lacking as a grade level.”
		Uses	How the group used data	“We took the attendance charts and reported our findings back to the full faculty.”
		Improvements	Specific data related improvements	“It looks like the school has made some progress on a few of our state assessments. I guess I relate that to some of the work we’ve done.”
3. Systems Thinking	ST	Group Uses	How ST was used by the group	“Systems thinking changed our way of viewing problems. We look at the whole school and try to make recommendations based on what is best for everyone.”
		Personal Uses	How ST was used by individuals	“I have started using different aspects of systems thinking in my classroom. It ties right into project-based learning.”
4. Professional Development	PD	Kinds	What types of PD were offered	“We have a conference every year that people present systems thinking tools. Just a way for us to continue learning the strategies.”
		Comfort Level	Comfort level with ST after PD	“I’m still learning. I have a lot to learn actually. I’m getting better at using the tools though.”
5. Leadership	LD	Decisions	Who makes the decisions for the school	“The principal makes the final decisions even if we discuss it and have input.”