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Adaptive Leadership and Student Achievement

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by

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Abstract

The purpose of this quantitative study was to examine the relationship, if any, between the adaptive culture of an elementary school and student achievement. The Adaptive Culture Profile Scale collected data from elementary school leadership teams across Minnesota. This data was then compared to student achievement results, as measured by the Minnesota Comprehensive Assessment (MCA). Results of the study indicate there is no relationship between adaptive culture of an elementary school and student achievement proficiency or student achievement growth. Pearson's –r correlation was used to determine the lack of relationship. This study suggests further research is needed to continue to learn about adaptive leadership within an educational setting and fill the research gap.

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Chapter 1: Introduction

Introduction to the Problem

National reform efforts have been at the center of education in the United States since 1983. Beginning with the publication of *A Nation at Risk* (1983), moving to more recent legislation of the No Child Left Behind Act (2001) and most currently, the Every Student Succeeds Act (2016), many school leaders are faced with the demanding need to effectively lead adaptive, complex change (Drago-Severson, et al., 2012; Drago-Severson, et al., 2014; Glatter, 2006; Ruff & Shoho, 2005). Despite this urgency for effective leadership and change in accountability measures over time (Taylor, 2010), the structure of schooling and classroom teaching remain the same (Cuban, 2012). Nationally, over 10,000 schools are labeled as being in need of improvement and another 2,300 are in need of restructuring (Adelman & Taylor, 2011). According to 2016 Minnesota legislation, the bottom 5% of schools in Minnesota are considered failing schools and are in need of continuous school improvement support (Minnesota Department of Education, 2016). As a nation, we have been working to turn schools around for decades, with little to no improvement (Adelman & Taylor, 2011).

Schools labeled as failing under the No Child Left Behind Act (2001) and earning a School Improvement Grant (2001) were provided with state funded turnaround support and strongly encouraged to replace their school principal as part of their reform efforts. However, research (Hochbein & Cunningham, 2013) suggested this is not an adequate reform strategy. Rather than replacing the principal, studies (Adelman & Taylor, 2007; Glatter, 2006) recommended a shift in leadership thinking. School leadership has historically been thought of as primarily a management role, focusing on the work of the leader in isolation (Glatter, 2006). A modern perspective asserts that school leadership should be focused more on the system in which

the leader serves, addressing systemic change within complex systems (Adelman & Taylor, 2007; Glatter, 2006). A focus on systemic change allows a leader to better target improvements in student achievement (Taylor & LaCava, 2011).

This daunting task of increasing student achievement, especially in schools with low academic achievement and high poverty, is what Heifetz (2009) referred to as an adaptive challenge (Drago-Severson et al., 2012). While these leaders still face technical demands, the greatest challenges they face are adaptive (Drago-Severson et al., 2012). Leading adaptive change requires leaders who are relentless, focused, and different from leaders who only manage technical change (Taylor & LaCava, 2011). Principals who are able to effectively lead this more challenging work will realize greater benefits for teachers and students within their system.

In order to more fully create positive school reform, leaders must view schools as multi-faceted organizations (Glatter, 2006). Leaders must employ an adaptive leadership framework to create innovative organizations that are able to respond and adapt to complex change (Raney, 2014).

Statement of the Problem

National reform efforts have long been at the center of educational politics. Numerous attempts have been made to make American schools the best of the best. Starting with *A Nation at Risk* (1983), eventually moving towards No Child Left Behind (2001), Common Core State Standards (2010), and most recently, The Every Student Succeeds Act (2015), a need to increase student achievement generates a reform model with a new name, but rarely a new approach. Each reform effort focused on expectations around student learning, assessment, and holding educators accountable. This might have been effective if the education process was a symplistic system but rather, the education process is complex (Tschannen-Moran & Gareis, 2014). In fact,

there is no evidence that these reform methods improved student performance for students, including those who are low-income and minority (DuFour, 2016). According to Dufour's (2016) analysis of PISA results, high performing nations have not implemented the reform methods historically being required in American public schools. In addition to data from PISA, other statistics are frightening. United States high school graduation rates fall far behind other countries. Nearly 40% of all U.S. students who enter college must take remedial courses. Nearly 65% of professors report what is taught in high school does not prepare students for college. Of the fastest-growing and best-paying jobs, 90% now require a post-secondary education, however the United States is tenth among industrial nations in the rate of college completion. Students continue to graduate from both high school and college, unprepared for the working world (Wagner, 2008).

American schools are often labeled as failing, yet reform efforts continue to focus on more testing and more teaching to the test (Christensen, Horn, & Johnson, 2008). Schools that were originally designed for an industrial economy have failed to adapt to today's knowledge economy. While the world has changed, U.S. schools have not. American schools are not failing, however they are obsolete (Wagner, 2008). Teaching students the curiosity and thinking skills necessary for today's knowledge economy is not a technical problem. It requires schools to adapt and to rethink what schooling currently looks like, as well as what the U.S. expects their high school students to know and be able to do (Christensen, et. al, 2008).

Purpose

The purpose of this study was to explore what relationship, if any, exists between an elementary school's adaptive culture and student achievement proficiency and student

achievement growth as measured by state-wide accountability testing, the Minnesota Comprehensive Assessment.

Research Questions

This study intended to address the following questions:

- Q1: What relationship, if any, exists between an elementary school's adaptive culture profile and student achievement proficiency?
    - H_{1o}: There is no relationship between adaptive culture within elementary schools and student achievement proficiency scores.
    - H_{1a}: There is a relationship between adaptive culture within elementary schools and student achievement proficiency scores.
    - $H1_{ao}$: There is no relationship between adaptive culture within elementary schools and math student achievement proficiency scores.
    - $H1_{aa}$: There is a relationship between adaptive culture within elementary schools and math student achievement proficiency scores.
    - $H1_{bo}$: There is no relationship between adaptive culture within elementary schools and reading student achievement proficiency scores.
    - $H1_{ba}$: There is a relationship between adaptive culture within elementary schools and reading student achievement proficiency scores.
- Q2: What relationship, if any, exists between an elementary school's adaptive culture profile and growth in student achievement?
    - H_{2o}: There is no relationship between an elementary school's adaptive culture and growth in student achievement.

- H_{2a}: There is a relationship between an elementary school's adaptive culture and growth in student achievement.
- $H2_{ao}$: There is no relationship between an elementary school's adaptive culture profile and growth in student math achievement.
- $H2_{aa}$: There is a relationship between an elementary school's adaptive culture profile and growth in student math achievement.
- $H2_{bo}$: There is no relationship between an elementary school's adaptive culture profile and growth in student reading achievement.
- $H2_{ba}$: There is a relationship between an elementary school's adaptive culture profile and growth in student reading achievement.

- Q3: What relationship, if any, exists between an elementary school's adaptive culture profile and the student achievement growth for students in poverty?
  - H_{3o}: There is no relationship between and elementary school's adaptive culture profile and student achievement growth scores for students in poverty.
  - H_{3a}: There is a relationship between and elementary school's adaptive culture profile and student achievement growth scores for students in poverty.
  - $H3_{a0}$: There is no relationship between an elementary school's adaptive culture profile and math student achievement growth for students in poverty.
  - $H3_{aa}$: There is a relationship between an elementary school's adaptive culture profile and math student achievement growth for students in poverty.
  - $H3_{b0}$: There is no relationship between an elementary school's adaptive culture profile and reading student achievement growth for students in poverty.

- $H3_{ba}$: There is a relationship between an elementary school's adaptive culture profile and reading student achievement growth for students in poverty.

Significance of the Study

Elementary principals impact student achievement (Adelman & Taylor, 2007; Daly & Chrispeels, 2008; Finnigan, 2012; Hochbein & Cunningham, 2013; Johnson et al., 2012; Taylor & LaCava, 2011; Ward, 2013; Waters et al., 2003). Accountability practices focused on increasing student achievement (ESSA, 2016), as well as the increase of complex problems throughout education (Drago-Severson et al., 2012; Drago-Severson, et al., 2014; Glatter, 2006; Ruff & Shoho, 2005), created a significant need to delve deeper into determining the impact adaptive culture led by elementary principals and teacher leaders can have on student achievement. While organizational culture has been a research topic within the business world, the education world has been disinterested (Hall & Hord, 2011).

Research centered on instructional leadership in education has provided helpful theories and personal anecdotes. The field is lacking in current quantitative data and practical advice for leaders in low-performing schools (Adelman & Taylor, 2011; Glatter, 2006; Taylor, 2010; Waters, et al., 2003). Marzano, Waters and McNulty (2005) in their synthesis of educational leadership studies found very few studies that addressed the relationship between student achievement and leadership. Between 1980-1995, over 5,000 articles and studies addressed school leadership. Of those, only 70 analyzed the quantitative relationship between student academic achievement and school leadership (Marzano et al., 2005). Little has changed since the 2005 study. More emphasis has been allocated to speculating which characteristics might cause low performance than to researching leadership qualities necessary for adapting schools to

changing student demographics and a changing world (Adelman & Taylor, 2007; Adelman & Taylor, 2011).

Despite national reform efforts and countless studies on the impact of the principal, there is little research regarding the work of adaptive leadership in relationship to increasing student achievement (Adelman & Taylor, 2007; Hochbein & Cunningham, 2013). Adaptive leadership is necessary to manage the complex organizational change that is needed in schools today (Raney, 2014). Educational leadership could benefit from specific research regarding adaptive leadership behaviors, particularly how the implementation of adaptive culture by the principal and teacher leaders relates to increases in student achievement. Johnson, Kraft, and Papay (2012) reported only one other study that has associated student achievement with the culture of schools.

Heifetz and Linsky (2009) developed the Theory of Adaptive Leadership but have not operationalized or empirically tested the theory. This lack of current research regarding the Theory of Adaptive Leadership within elementary school culture and student achievement creates a "knowledge gap" (Merriam, 2009, p. 59). Merriam suggested researchers address closing this gap between known and unknown. A need exists for quantitative studies that can more definitively explore the relationship between adaptive culture and student achievement (Campbell-Evans, 2014; Daly & Chrispeels, 2008; Glatter, 2006; Kaiser, Hogan & Craig, 2008). This study addressed the gap by analyzing adaptive culture within elementary schools and determining the relationship, if any, to increased student achievement proficiency scores and student achievement growth scores. This study contributed to the need for quantitative studies and also suggests the need for further studies including the relationship between adaptive leadership and school culture or adaptive leadership and teacher retention.

Definition of Terms

Adaptive Culture – The culture of an organization can be uncovered by analyzing the stories, rituals and norms of the organization (Heifetz, et. al, 2009). If these stories, rituals and norms reinforce the status quo, the organization may not be open to change, and thus may not be adaptive.

Adaptive Culture Profile Scale (ACPS) – This survey was developed by Dr. Tammy Fowler from Arkansas State University. The tool is intended to measure the adaptive culture of an organization in order to help the organization determine areas in which it could become more adaptive.

Adaptive Leadership – Leaders who have the ability to articulate a vision, observe changes, and move from the vision to reality within an organization (Fowler, 2013). Adaptive leadership gives the work to the people and keeps the focus on the goal of the work.

Elementary and Secondary Education Act (ESEA) – Part of President Johnson's Great Society program. This act was passed in 1965 and provided a clear role for the federal government within K-12 education. In its first year, the act distributed more than one billion dollars to schools, through a program called Title One. This program was designed to help schools off-set the cost of educating students in poverty (Editorial Projects in Education Research Center, 2015).

Elementary School – The Minnesota Department of Education classifies elementary schools as those schools that serve grades PK-6 and are labeled with the code "10". For the purposes of this study, the elementary school must include at least third and fourth grades as they are the first grades included in state accountability testing each year.

Elephants are Named – One of five constructs on the ACPS. This construct focuses on the difficult issues and problems that are often unnamed in organizations. These are the issues and problems often referred to as the 'elephant in the room'. Being able to openly discuss these and call them by name is characteristic of an adaptive culture (Fowler, 2013).

Every Student Succeeds Act (ESSA) – President Obama signed the Every Student Succeeds Act in 2015, replacing the No Child Left Behind Act. At the time of this research, states were still awaiting further guidance from the Federal Department of Education regarding data reporting, regulations, and accountability under this new mandate (Minnesota Department of Education).

Free and Reduced Price Lunch – A student from a household with an income rate at or below 130% of the poverty threshold is able to receive free school lunch. A student from a household with an income rate between 130% and 185% of the poverty threshold is able to receive a reduced price lunch. Often times the percentage of free and reduced price lunch students within a school system is used as a measurement of poverty within a school or district (Snyder & Musu-Gillette, 2015).

Independent Judgment is Exercised – This is a characteristic of an adaptive culture that is measured on the ACPS. When independent judgment is exercised within an organization, individuals are capable of making decisions without needing to consult with authority. Their decisions are based upon and align to the vision of the organization.

Leadership is Developed – The development of leadership is a construct within the ACPS. In adaptive cultures, leadership is developed within all members of the organization. Those in authority make conscious efforts to develop leadership within all members by encouraging independent judgment, allowing others to take initiative, and listening to all ideas.

Minnesota Elementary School Principals Association (MESPA) – MESPA is an organization that serves elementary and middle level principals. MESPA is affiliated with the National Association of Elementary School Principals (NAESP). Both organizations provide professional development, legal counsel, legislative advocacy, and honors and recognition for its members. Within Minnesota, MESPA is divided into 12 regional divisions (Minnesota Elementary Principals Association, 2017).

Minnesota Comprehensive Assessment – Standards based assessments given annually to students in Minnesota in Grades 3-11. Students take one assessment in each subject for reading (Grades 3-8, 10), math (Grades 3-8, 11), and science (Grades 5, 8, and once in high school). The assessments meet both state and federal accountability requirements (Minnesota Department of Education, 2017).

No Child Left Behind (NCLB) – Signed into law by President Bush in 2002. This was an update of ESEA. This law was the result of a desire to create a more competitive American education system. The law specifically focused on the academic progress of particular student groups including special education, English Language Learners, students in poverty, and racial/ethnic groups. States that chose not to participate risked losing Federal Title One dollars (Editorial Projects in Education Research Center, 2015).

Proficiency – Students who achieve a "meet" or "exceed" on math or reading MCA are considered to be proficient in that respective subject. The student's item response pattern is converted into a scale score. Any scale score of g50 (g=grade) is considered to have met the standards, or to be proficient (Minnesota Department of Education Interpretive Guide, 2015).

Poverty – Federal poverty levels are determined by the U.S. Census Bureau. A family's poverty level is calculated by using the number of members in the family and the age of the

householder. If the family's income is below the poverty threshold for their family size, the entire family is considered to be living in poverty. Students living in poverty are at more risk for lower academic achievement than their more advantaged peers (Minnesota Department of Health, 2017).

Reflection is Learning – The degree to which reflection and learning is encouraged is measured on the ACPS. Organizations with an adaptive culture allow individuals to take risks and reflect upon learning opportunities, even if the risk results in failure. This risk taking and reflection allows individuals to adjust their decisions and adapt to changes within the organization (Fowler, 2013).

Responsibility for the Organization is Shared – The degree to which responsibility is shared is measured on the ACPS. In organizations with an adaptive culture, planning, goals, and implementation are shared throughout the organization without emphasis on authority or position within the organization. Recognition is based on both individual and team efforts (Fowler, 2013).

School Improvement Grant (SIG) – Grants that were provided under section 1000(g) of Title One of the ESEA Act of 1965. Grants were provided to states and then rolled out to local school districts to be used for turnaround efforts at the lowest-performing schools. Under ESSA, school improvement grants are no longer offered to schools in Minnesota (U.S. Department of Education, 2016).

Student Growth Z-Score – A "z-score" indicates student growth on the MCAs. A score can be calculated using the following formula: Z-score = (Student Score – Expectation) ÷ standard deviation. A z-score of zero indicates a student has demonstrated as much growth as an average student. A positive z-score indicates a student made more than average growth. Likewise, a student with a negative z-score indicates a student made less growth than average.

Individual student growth z-scores are averaged together to create a school growth z-score (Hiawatha Valley Education District, n.d.).

Title One – Part of the Elementary and Secondary Education Act (ESEA). Title One, Part A provides funding to schools that have large numbers of students who received free and reduced price lunch (students living in poverty). Schools complete an annual Title One application to receive funding. Title One was first offered to schools as part of President Johnson's Elementary and Secondary Education Act (Minnesota Department of Education, 2017).

Conclusion

Schools continue to see frequent changes in student demographics and student learning needs. The needs of the world have shifted from an industrial economy to a knowledge economy. School leaders have been provided with technical knowledge regarding meeting these changes but lack the adaptive knowledge to develop a culture in which a school can change to best meet the needs of its students and provide them with the skills needed to be successful in the 21st century and beyond.

Chapter II: Literature Review

Introduction

To best understand the needs of schools today, this chapter begins with a review of current demographics within schools. These demographic changes include increases in population, changes in socioeconomics, ethnic background, and mental health. These statistical changes are then followed by background information on change theory. Understanding the theory of how change is implemented within systems is fundamental to beginning to think of how a school system might best change to meet the new demands of its student population and a changing world.

Following change theory, principal leadership and adaptive leadership are discussed. This includes a review of how principal leadership is typically perceived and how that differs from adaptive leadership. Finally, this chapter concludes with a connection between leadership and its impact on the culture of a system, more specifically, how a leader can develop an adaptive culture that encourages change and creates conditions for increased student achievement.

Schools Today

Between 2010 and 2015, demographics within Minnesota grew and changed, at times in significant ways. The Minnesota State Demographic Center reported the state population grew 3.4% between 2010 and 2015. Wright County alone grew by nearly 7,000 people, the second highest county growth rate in the state. During 2010-2015, the number of Minnesota residents of color grew to four times that of non-Hispanic white residents. The fastest growing of these non-white racial groups was the Asian population, which saw a 22% growth. This is followed by black (16% growth) and Hispanic (13% growth). These changing demographics are reflected in schools' student populations. Minnesota COMPASS, a research organization that tracks trends in

education, economy and workforce, health, housing, public safety, and other areas within Minnesota reported the following changes impacting children and education within Minnesota. In 2014, 12,700 babies born in Minnesota were born to mothers who were born outside of the United States (typically Somalia or Mexico). During that same year, 188,700 (15%) of Minnesota children were living below the poverty line. From 2003-2015, the number of homeless children within Minnesota increased from 3,027 to 3,509. The number of psychiatric hospital admission for children ages 14-17 increased from 10 per 1,000 residents to 15.7 per 1,000 residents. While the number of homeless children and psychiatric hospital admissions numbers increased for children, the numbers for adults decreased. These changes in mental health, socioeconomic status, and home languages have direct impact on the needs of students within the public school systems within the state of Minnesota. While technical challenges within schools still exist, changing demographics contribute to an increase in adaptive challenges (Drago-Severson, 2012; Drago-Severson, Maslin-Ostrowski, Hoffman, & Barbaro, 2014). Schools face pressure from these rapidly changing demographics as well an ever-evolving global economy (Tschannen-Moran, 2009).

Despite these demographic changes, the structure of schooling has remained the same as it has been for at least the past 100 years (Daly & Chrispeels, 2008; Neumann, 2013). The structure and classroom teaching practices have changed over the past 200 years, but the continuity of instruction and schooling continues to make the structure of schooling similar from one generation to another (Cuban, 2012).

In the mid-1960s, President Lyndon Johnson's War on Poverty created a focus on educational reform (Marzano et al., 2005) with the intent of closing the achievement gap between students who "have" and those who "have not." Yet, after more than 50 years, the

disparities continue to grow between those who live in well-funded communities and those who do not (Michelman, 2015). Student achievement for marginalized populations continues to be mediocre, with no considerable gains in reading and math (Blasé, Fixsen, Sims, & Ward, 2015). At the same time, 51% of American public school students qualify for Title One funded services; a program designed to provide additional academic support for students who quality for Free and Reduced Priced Lunch (Michelman, 2016). Concentrated poverty negatively impacts student achievement, both at the school level and district level (Poverty and Race Research Action Council, 2016). Generally, this shift happens when the number of students living in poverty or the percentage of minority students becomes 50% (Poverty and Race Research Action Council, 2016). The number of students who are considered living in poverty is climbing, with little to no changes in their academic achievement. Through the implementation of NCLB, expectations were set to focus on closing this achievement gap and disaggregating student data to make clear how ethnic groups and students living in poverty were underperforming (Michelman, 2016). Accountability based on test scores has proven to be an ineffective means of school turnaround (Michelman, 2016). School turnaround lacks effective strategies for systemic change (Adelman & Taylor, 2011). Routine classroom practices are suggested rather than innovative system changes (Adelman & Taylor, 2007; Cuban, 2012). Overemphasis on bureaucratic-like strategies to organize the complexity of schools decreases the schools' ability to adapt to student and global needs (Tschannen-Moran, 2009). To truly make a change for minority students and students living in poverty, a shift in values and beliefs needs to happen (Michelman, 2016). The classroom of the industrial era was designed to control students and future employees because their future work was mostly technical. Within the current knowledge era, the focus needs to instead be on mobilizing people to make the most of their potential (Eichholz, 2014). As Hogan

(2008) stated, sometimes thinking outside the box is not enough. Sometimes changing the box is what is required. This is adaptive work.

Educational leadership programs need to focus on creating leaders who can manage systemic change (Adelman & Taylor, 2007). Rather than building adaptive leaders who can establish an adaptive culture, most programs focus on distributed leadership (Drago-Severson, Maslin-Ostrowski, & Hoffman, 2012). It would be beneficial if these programs were oriented toward a model that engages leaders in solving complex problems (Nicolaides & McCallum, 2013). Given the current complexity of schools, the need is for creativity and innovation, however, the focus of most principals and principal preparation programs lies in creating highly reliable organizations, with little focus on innovation or creativity (Glatter, 2006). Glatter (2006) continued by stating the administrative field has long focused on critiquing individuals, with little focus on sustaining action and demonstrating results, creating a credibility crisis.

These demographic changes have created adaptive challenges for schools in the midst of an education era of accountability (Drago-Severson et al., 2012). In 2011, 10,676 schools in the United States are labeled as being in need of improvement; 2,302 as needing restructuring. Those schools in the bottom 5% are viewed as failing (Adelman & Taylor, 2011). Creating the drastic change that is needed within schools deemed as failing requires leaders who make significant changes for student achievement (Taylor, 2010). This need for drastic change called for leaders who are capable of leading during times of adaptive challenges and developing an adaptive culture within schools (Adelman & Taylor, 2007; Drago-Severson et al., 2012; Taylor & La Cava, 2011; Tschannen-Moran, 2009). Schools are not failing; they have become obsolete (Wagner, 2008).

Change Theory

Changing demographics call for changes within school systems that have been stagnate for much too long (Neumann, 2013). Hall and Hord (2015), described change as learning. "It's as simple and complex as that" (p. 53). They asserted change is a process that takes time to develop and individuals need to be at the center of the change process (Hall & Hord, 2015). Keeping individuals at the center of change is important as change is a very personal experience and individuals progress through a variety of emotions as they develop and learn throughout the change process (Drago-Severson, et al., 2012; Hall & Hord, 2015). For change processes to be effective, individuals need to embrace those efforts (Neumann, 2013). They need leaders who are able to motivate them when emotions rise or when tasks seem too complex (Adelman & Taylor, 2007). This is often emotional as individuals are asked to give up habits that are comfortable, in exchange for learning new habits and perhaps feeling incompetent (Blasé et al., 2015; Daly & Chrispeels, 2008). These emotional responses tend to produce one of two reactions by the school. They either lead to a school progressing at such a slow rate of change that they result in causing frustration among staff members and reap little benefits of the actual change (Marzano, Waters, & McNulty, 2005), or the school addresses the how-to portion of the change, without acknowledging the personal emotional concerns that are critical to implementing change (Bybee, 1996).

Heifetz et al. (2005) suggested two types of change: technical and adaptive. Other researchers (Marzano et al., 2005) within education referred to these two types of change as first order and second order. Heifetz et al. (2005) provided characteristics for distinguishing between adaptive and technical change. Change that is adaptive requires people to change their hearts and minds, not just routine behaviors. If a solution occurs and conflict continues, individuals may not

have accepted the loss or adjusted to the new solution, and the challenge is adaptive. Crisis is generally an indicator that adaptive challenges have been brewing for some time. Finally, if a leader has been trying several technical changes, with no success, an adaptive challenge is most likely present.

Large scale, school reform efforts align with generating adaptive change. They are messy, requiring a change in beliefs, habits, and devotions (Blasé et al., 2015). The only certain part of change is that it will be filled with bumps and twists along the way (Raney, 2014). When presented with new initiatives, only about 20% of educators are ready to begin the new innovation (Blasé et al., 2015). Leaders who rely on research around change and focus on both the technical and adaptive nature of change can support those who are reluctant and create the moral support necessary for such changes to take place (Bybee, 1996; Hall & Hord, 2011). Research (Waters, Marzano, & McNulty, 2003) determined two elements that predict whether leadership will have a positive or negative effect on achievement and change. The first of those elements is the focus of the change. If leaders are able to properly identify the change needed and keep the school focused on that change, they are likely to have a positive impact on student achievement. The second element is if leaders are able to properly determine the magnitude of change. Teaching, learning, resource allocation, and academic achievement is often considered to be the main focus in schools (Uline, Miller, & Tschannen-Moran, 1998). Leaders who also include a focus on changing the beliefs and values within a school, to focus on developing trust, raising morale and increasing student commitment, incorporate adaptive change as well (Uline et al., 1998). Most change within education has been a series of technical changes. Adaptive change within education is rare (Neumann, 2013). A greater impact is achieved when leaders can focus on both the technical aspects and the adaptive pieces of change (Taylor & La Cava, 2011; Uline

et al., 1998). The difficult task for leaders is correctly determining if the needed change is technical, adaptive, or a combination of the two. The complexity of an adaptive challenge is that often the nature of the problem is not clear (Campbell-Evans, 2014; Neumann, 2013). Defining the problem is a key step (Campbell-Evans, 2014). Change within large systems, such as schools, always requires more than simply good ideas or technical solutions. While those might be enough to change individuals, they are not enough for complicated systems (Adelman & Taylor, 2007; Blasé et al., 2015). Leaders tend to resort to what they know and what has worked in the past, rather than opening up themselves to new ways of thinking and changing the system (Nicolaides & McCallum, 2013). A key to the work for adaptive leaders is to understand adult learning and development to better support change within the larger system (Dargo-Severson et al., 2014). Changes within complex systems require not only learning of new information but also knowledge and performance in that new way. It requires learners to take action (Fabac, 2010). Training for leaders in this area is often rare, if at all (Adleman & Tayor, 2007). Many administrators have discovered that implementing any school improvement plan requires changing their complex system in fundamental means (Blasé et al., 2015).

Principal Leadership

Researchers (Daly & Chrispeels, 2008; Hochbein & Cunningham, 2013; Johnson, Kraft, & Papay, 2012; Marzano, 2005; Taylor & La Cava, 2011; Ward, 2013) identified the principal as having a large impact on quality teaching and higher student achievement. The impact is so large that leadership is noted as being second only to teaching in having an effect on student achievement (Daly & Chrispeels, 2008; Ward, 2013). Marzano (2005) described the principal as being the most influential and important person within any school system. Waters et al. (2003) determined the effect size between leadership and student achievement to be .25. One standard

deviation in leadership improvement could essentially provide an increase in student achievement from the 50th percentile to the 60th percentile; a statistically significant difference (Waters et al., 2003). Much of the principal's effect on student learning is indirect (Tschannen-Moran & Gareis, 2014).

Given this large impact, some school reform strategies have focused on changes within the principal role as a means to increase student achievement (Michelman, 2016). School principals have been held more accountable as part of NCLB and ESSA. The goal of school turnaround is often perceived as a very daunting adaptive challenge for school principals (Drago-Severson et al., 2012). As part of the School Improvement Grants (SIG) through No Child Left Behind (NCLB) legislation, schools receiving grants were urged to strongly consider replacing their principal with someone deemed more competent (Michelman, 2016). Hochbein and Cunningham (2013) studied the impact replacing a principal has on student achievement. They found changes in leadership did not significantly impact school performance. Within their study, Free and Reduced Lunch (FRL) percentages and prior-year accountability testing performance were stronger predictors of student achievement than a change in leadership. They also determined the principal needs to be in the leadership role at least four years before substantial comprehensive change is noted. If a change in the principal is not directly impacting student achievement, one questions exactly how a principal does impact student achievement.

Drago-Severson et al. (2012) suggested the role of principals is changing. Principals need to shift from a management role to a leadership role that focuses more heavily on teacher development and creation of collaborative learning environments. Glatter (2006) stated education within the United States has tended to place more emphasis on the management role, rather than leadership. Even within leadership, the focus has been more on the leader and less on

the environment in which the leader leads (Glatter, 2006). Organizations would be wise to evaluate leadership based on the accomplishments of the system, rather than characteristics of the person (Glatter, 2006). This focus on management is effective for leading technical change but highly ineffective for meeting the adaptive challenges faced by schools today (Drago-Severson et al., 2012).

Heifetz et al. (2005) specifically delineated between authority and leadership. They identified power to influence is the resource for authority and power. Power can be formal or informal. It is formal when it comes with the position; it is informal when it is attributed to personal characteristics. When power is conferred to perform a service, the person has authority. This power can be given and taken away, as part of an exchange. To some extent, authority relationships are conscious and voluntary. Authority provides direction, protection, and order. It is necessary for social organization. Authority can be either formal or informal. When the goal is change, formal authority can conflict with leadership as formal authority is designed for maintenance of systems, not disruption of the status quo (National Implementation Research Network, 2016). When school leaders rely heavily on authority and controlling risk, the result is an overstandardization (Tschannen-Moran, 2009). This was successful in the industrial era but is not a good fit for the current knowledge economy.

Leadership is linked closely to purpose. It is necessary to create distress, challenge the status quo, and change values. The differentiating question between the two is: Does making progress on this require changes in people's values, attitudes, or habits? If the answer is yes, leadership is needed. If no, then authority will do. Both authority and leadership need power, either formally or informally. If those in authority show leadership, they risk losing their legitimacy. This is why it is often challenging for those in authority, such as school principals, to

also lead, creating an especially high need for shared leadership that is so often described in principal leadership publications. Leadership within education is really intended to focus on mobilizing schools, families, and communities to tackle tough issues—issues that most would prefer to ignore (Heifetz & Linsky, 2004).

Finnigan (2012) determined instructional leadership was one of the most highly rated leadership behaviors noted by teachers in her study of turnaround school leaders. When considering the career decisions teachers make regarding their desire to remain in the profession, the quality of the principal's leadership is one of the most determining factors (Johnson, Kraft, & Papay, 2012). Leaders in need of creating a culture of trust and shared values will need to be willing to prepare staff to face tough conversations and realities (Raney, 2014). They need to being willing to tell people what they need to hear, rather than what they want to hear (Heifetz & Linsky, 2004). They must be willing to participate with staff, being open to change and engaging in a shared mission (Raney, 2014). While continuing to be held to a high level of accountability, they must be willing to engage in a shared leadership model (Ruff & Shoho, 2005). Unfortunately, capacity for building trust and supporting change is often weakest for leaders in lowest performing schools (Finnigan, 2012).

The significance of a school leader is greatest where and when it is needed most. Research (Louis, Leithwood, Wahlstrom, & Anderson, 2010) showed the impact of effective leadership is greatest in struggling schools in need of intervention. In fact, there is not one school turnaround documented without a talented principal (Louis et al., 2010). This shift in leadership role creates a need to better understand how principals can best support teacher development, school improvement, and ultimately increased student achievement (Hochbein & Cunningham, 2013). Taylor (2010) stated there are particular behaviors associated with adaptive leadership

enacted by leaders who successfully lead change within complex systems. These behaviors include learning how to develop their own capacity as well as the leadership capacity of teacher leaders. This capacity building requires learning through leadership, rather than focusing on discrete skills (Drago-Severson et al., 2014). Learning-centered leadership has been suggested as a means for leaders to build their capacity within their leadership role (Glatter, 2006). Effective leaders are able to lead both technical and adaptive changes (Waters et al., 2003). In order to meet these increasing adaptive needs, along with increased accountability, a new form of leadership is essential (Ruff & Shoho, 2005).

Given the complexity of turning around low-performing schools, leaders need to build their capacity to lead adaptive challenges (Adelman & Taylor, 2011). Those leaders who are able to make substantive change in academic achievement of students are able to put theory into practice in a context that matters for their system (Adelman & Taylor, 2007; Drago-Severson et al., 2012; Taylor, 2010). A review of literature suggests that while there is an exhaustive list of research around leadership, a common list of essential practices and cognitive aspects that reliably result in effective leadership ceases to exist (Hochbein & Cunningham, 2013; Marzano et al., 2005; Ruff & Shoho, 2005; Waters et al., 2003).

Adaptive and Technical Leadership

Redesigning an organization requires a new means of learning to address complex change and challenges (Nicolaides & McCallum, 2013). Redesign is exactly what today's schools need. Schools have failed to adapt to changes in student demographics and student learning needs (Daly & Chrispeels, 2008). Just as organisms must adapt to changing contexts, so must schools in order to thrive (Daly & Chrispeels, 2008).

The theory of adaptive leadership was defined by Heifetz (2009). Heifetz described two types of leadership: technical and adaptive. Technical leadership is needed for quick fixes within a current system; solutions that can easily be identified and enacted (Heifetz, 2009). They are changes that align with current beliefs and values (Daly & Chrispeels, 2008). Unlike technical leadership, adaptive leadership is typically associated with changing values and norms (Daly & Chrispeels, 2008; Nicolaides & McCallum, 2013; Waters et al., 2003). Adaptive leadership closes a gap between the current reality and the beliefs that are held within the organization (Daly & Chrispeels, 2008; Heifetz, 2009). Theoretical research on change suggests that not all change is equal (Waters et al., 2003). Some change has greater impacts on faculty than others. The assumption that all change will have the same impact works when the change is technical, but results in a negative impact when the change is adaptive (Waters et al., 2003). Technical leadership can be likened to good management. Those with technical leadership skills work in a zone where there is a great amount of agreement about what needs to be done and a great amount of certainty regarding how to do it. Adaptive leadership is required when there is little agreement and large uncertainty. Adaptive leaders understand the complexity of the systems they lead (NIRN, 2016).

Closing the gap between known values and enacted values requires leadership centered on learning, innovation, and collective responsibility (Daly & Chrispeels, 2008; Nicolaides & McCallum, 2013). Leaders seeking to solve adaptive issues are encouraged to balance action with perspective taking, move from the dance floor to the balcony and reframe the problem into one that generates inquiry and collective problem solving rather than blaming and shaming (Nicolaides & McCallum, 2013). They are also encouraged to engage in three challenging tasks: determine what to preserve from the past, what to eliminate from the past, and create ways to

build upon the best of the past (Drago-Severson et al., 2014). This requires leaders who practice inquiry and invite others to participate with curiosity, rather than reactivity. This work of inquiry is emotional work. It requires participants to mourn the loss of the old way of doing things. It is emotional to give up what one knows well to begin practices that are new and unfamiliar (Daly & Chrispeels, 2008). In essence, organizations are asked to engage in a messy process, requiring multiple vantage points and ultimately changing the culture's DNA (Campbell-Evans, 2014).

Many organizations shy away from addressing intense emotions created by complex change and try to solve their adaptive issue with a technical fix. Often the solutions are not found within technical answers, but rather within people, as most social challenges are adaptive (Heifetz & Linsky, 2004). This is the most common leadership failure (Drago-Severson et al., 2014). Given the increased adaptive challenges in today's educational settings, leaders must know how to identify technical and adaptive challenges and how to properly address each in order to create a redesigned, healthy culture that allows for increased student achievement (Drago-Severson et al., 2012; Drago-Severson et al., 2014). The key to this adaptive work is developing leaders who understand how to support adult learning within their systems and within themselves (Drago-Severson et al., 2012; Drago-Severson et al., 2014). Adaptive work also requires leaders to define a challenge that is often unclear and then support the system as they work within a zone of tension to solve the challenge (Campbell-Evans, 2014). Leaders need to be able to differentiate technical challenges from adaptive challenges, knowing that often they present themselves together, rather than separately (Drago-Severson et al., 2012; Waters et al., 2003). The ability to make this distinction and then correctly address the challenge and opportunity separates good leaders from great leaders (Raney, 2014). Organizations that are able

to adapt and survive do so because of their adaptive capacity. This capacity has been developed through deliberate leadership (Eicholz, 2014).

Heifetz et al. (2005) described six characteristics of adaptive leaders. Adaptive leaders are able to view situations from the balcony, taking a step back from their work on the so-called dance floor. Adaptive leaders ask questions regarding the know-why, not the know-how. They are concerned with where people are at within the change process. Successful adaptive leaders are able to listen to others and understand the hidden meanings in what is being conveyed (Fowler, 2013). Leaders are able to see the bigger picture of what is happening in order to take a more strategic approach (Campbell-Evans, 2014).

Adaptive change requires people to close gaps between their professed beliefs and their actual behavior. This often requires acknowledging a loss. In order to accomplish this, adaptive leaders need to focus on relationships, keeping allies close, but keeping resistors even closer (Fowler, 2013). Heifetz et al., (2005) referred to this as the ability to think politically.

Adaptive leaders pace the work as they orchestrate conflict (Heifetz et al., 2005). They realize all social relationships have limits. The adaptive leader learns how to control conflict and keep people working at productive levels. The adaptive leader can raise or lower the temperature of change. Heifetz (2005) referred to this as the zone of productive disequilibrium. This zone is different for each individual and each organization. Those with a larger adaptive capacity have a larger zone and can reach the zone and stay in it for a longer period of time than those with a smaller adaptive capacity (Campbell-Evans, 2014; Eichholz, 2014). Technical leaders, or managers, work outside the zone of productive disequilibrium, where there is much certainty of what needs to be done and little risk. Adaptive leaders keep the work within the zone where there is less certainty and little agreement (National Implementation Research Center, 2016). The zone

of productive disequilibrium is an element of adaptive leadership that distinguishes it from other leadership frameworks (Campbell-Evans, 2014).

Solutions to adaptive challenges cannot be solved by a leader, but rather the work must be given back to the people (Heifetz et al., 2005). Only individuals can change their behavior, values, attitudes, or beliefs. Those who own the problem are the people who need to solve the problem (Fowler, 2013). Adaptive leadership focuses on the problem and the people who are doing the work (Fowler, 2013). Leaders take action and engage in interventions that help to keep the work moving forward. Even inaction is interpreted as an action (Fowler, 2013).

Adaptive leaders need to know when to wait or when to ripen the adaptive issue. They need to be comfortable with taking the heat, making decisions, and being able to defend their position without becoming personally defensive (Heifetz et al., 2005). Knowing what people are thinking, how they are affected by the change, what they need to learn, and what people are saying and doing allows adaptive leaders to know when to push and when to let the situation ripen (Fowler, 2013).

Leading through adaptive change is a personal experience, involving personal risk. The ability to lead such change is not dependent on personality or the position of the leader. The process of adaptive change can be led by anyone who can correctly identify the problems, focus the change, and work to reach solutions (Fowler, 2013).

The characteristics of adaptive leaders are valuable in allowing an organization to fulfill its desire to change and grow in response to adaptive challenges (Raney, 2014). Adaptive leadership allows a leader to decipher between adaptive and technical change. It also creates a leader who can address the realities of tension between differing perspectives, situations of difficult learning and loss, and the disequilibrium of experimentation (Raney, 2014). The leader

is able to trust that these practices will lead to treating others with respect and will produce a community that is responsive to change and resilient (Raney, 2014).

School Culture

Research does not suggest specific practices that describe effective leadership, however there are some broad areas that have been proposed as having significant impact on the success of school leaders. School leadership has been linked to school culture, climate, and teacher leadership (Hochbein & Cunningham, 2013; Marzano et al., 2005). These areas have been determined to have the greatest impact on student achievement growth (Johnson, Kraft, & Papay, 2012). Johnson et al. (2012) stated most teacher turnover in low-performing schools is due more to dysfunctional work climate and leadership than high rates of minority and low-income students. Schools with more pleasant working conditions show greater student achievement, most likely because the environment teachers teach in, is the same environment students learn in (Johnson et al., 2012). This indicates the significant impact leadership has on a school's culture and student achievement. Raney (2014) declared the health of an organization lies entirely on the administration. Leaders need to better understand the elements that define a school's culture. Often, climate is confused with culture. The organizational climate refers to people's mood during a specific period of time. Changing the culture has little to do with fixing the climate. The climate might actually decrease when an organization is working adaptively (Eichholz, 2014). The culture of today's schools is designed to produce their current outcomes and behaviors—regardless if these are the outcomes one desires (Walker & Soule, 2017).

Private, public, nonprofit, and government organizations are all entities within the category of organizational culture (Schein, 2010). Knowing this type of culture is important to understanding it and its connection to leadership. Schein (2010) defined culture as the foundation

for the social order and the rules we follow. It is the shared experiences that develop into assumptions by members of a group or organization (Hall & Hord, 2011). While the field of culture has not been studied in depth in the organizational domain, the connection between leadership and culture is most clear within organizational cultures (Schein, 2010). Leaders are those who create, change, manage, and manipulate culture. Since leaders both create and manage culture, Schein (2010) suggested, "leadership and culture are two sides of the same coin (p. 3)". If a culture becomes dysfunctional or begins to experience crisis, it is imperative that the leader notice this crisis and manage the adaptation of the culture so that the group can survive (Schein, 2010). To determine the culture of a system, Schein (2010) recommended examining three layers of the organization's culture.

Artifacts are visible processes and structures within an organization such as the environment, technology, clothing, manners, stories, published values, and observable rituals. This includes the climate of the group. While artifacts are easy to see and feel, they can be challenging to decipher as they are based upon the observer's inference and background knowledge. What the observer might see and interpret might be vastly different than what is experienced by individuals within the organization. This can be made clearer by either spending more time in the organization or by having conversations with those within the organization.

Individual beliefs or values become espoused beliefs and values through two means. One, a leader can suggest a belief or value, the solution works, and the value eventually becomes a shared assumption. Eventually group members forget where this original value stemmed from. Second, individual beliefs and values can become espoused through social validation. These are values and beliefs that are confirmed through social experiences of the group. Often those who do not agree with the social validation are excluded from the group. Over time, many

organizations find that their espoused values conflict with their actions. For example, a company says that they believe in teamwork and yet individuals are rewarded. When analyzing espoused beliefs, it is important to discriminate between those that align with the underlying assumptions, and those that are part of the mission of the organization, and those that are simply aspirations of the organization. To better understand the difference between these three an observer needs to discover the basic assumptions of the organization.

Basic underlying assumptions are the values and beliefs that are taken for granted. They guide behavior within the organization and are extremely challenging to change. They provide cognitive stability and can produce feelings of anxiety when the organization attempts to change its basic underlying assumptions. It is easier for individuals to deny, blame, or rationalize than to change their basic assumptions.

Identifying how cultures are created is essential to supporting principals (Drago-Severson et al., 2012). Roby (2011) reported cultures within systems are developed through social interactions and relationships rather than a culture being placed upon the system. In fact, these social matters are so powerful, their effects on student achievement are significantly larger than those of facilities and resources (Johnson et al., 2012). Social matters can further be defined as collegial relationships, principals' leadership, and creating an environment conducive to learning (Johnson et al., 2012). Other research concurs with these findings, suggesting that effective principals focus on instructional leadership, trust, and supporting change (Finnigan, 2012; Roby, 2011). A study by Bobbett, Ellett, Teddlie, Olivier, and Rugutt), noted a strong positive relationship between the culture within a school and student performance. After controlling for effects not within their control (poverty, etc.), culture indicated the largest variation among school performance, based on student achievement (Hall & Hord, 2011).

Hoy and Tschannen-Moran (1999) explored to what extent trust is necessary for student achievement. They began by defining trust as the desire to be open to another individual or group, based on the knowledge that the other group will be honest, open, and dependable. They found teachers have a stronger trust for each other, their students, and families when they trust their principal (Hoy & Tschannen-Moran, 1999). This relational trust is developed through day-to-day interactions and social exchanges and is very impactful on a school's ability to improve (Johnson et al., 2012; Ward, 2013). Teachers working with minority students and those living in poverty were more likely to base job retention decisions on their working environment, rather than the students they were serving (Johnson et al., 2012). This provides evidence that principal leadership and school culture are predictors of student achievement growth (Johnson et al., 2012). Trust is necessary to redesign an organization (Nicolaides & McCallum, 2013; Ward, 2013). This redesign benefits all stakeholders (Ward, 2013). Teachers who have greater trust of their principal, are also more likely to trust each other and families (Hoy & Tschannen-Moran, 1999). Student achievement increases and teacher work conditions become student learning conditions (Johnson et al., 2012). This foundation of trust allows organizations to conquer challenges that require honest and sometimes, brutal confrontation of the current realities and the work required to re-structure the system (Adelman & Taylor, 2007; Nicolaides & McCallum, 2013; Ruff & Shoho, 2005; Uline et al., 1998).

Adaptive Culture

In order for leaders to develop trust and lead adaptively, the culture of the organization needs to be one that supports and encourages adaptability (Fowler, 2013). This type of culture includes human emotions that can often prevent or slow down change, despite the need for it

(Eichholz, 2014). Heifetz (2009) defined this as an organization developing an adaptive culture. Heifetz explained that an adaptive culture consists of five constructs.

Adaptive cultures are able to name the elephants. No issues are too sensitive to be questioned or are off-limits for discussion. This keeps the organization agile and flexible enough to adapt.

Independent judgment is exercised within adaptive cultures. Formal authority or responsibility is ignored and decision-making and idea generation is pushed deep down the organizational chart. Adaptive cultures relentlessly focus on the development of people within the organization (Fleming, 2016).

Adaptive cultures work to develop leadership beyond those who hold formal leadership roles. Talented individuals are hired, placed in the right positions, and given the opportunity for professional development. Collins (2011) referred to this as putting the right people in the right seats on the proverbial bus. Leadership and succession allows for individual talent to be developed deep within the organization. This act of developing people who are able to act with a purpose, to reflect, and face challenges is the key to becoming more adaptive. Simply establishing a purpose will not create more adaptivity—that is technical work (Eichholz, 2014).

Individuals within an adaptive organization are acutely aware of what they know and what they do not know. Adaptively solving problems requires organizations to learn new ways of doing work. Being aware of what individuals know and do not know allows the individuals within the organization to more quickly learn new ways to do the work. This problem-solving orientation also allows culture to view mistakes as opportunities for learning, rather than opportunities for blame (Tschannen-Moran, 2009).

The organization works together as a team. Rewards are connected to overall performance. When organizations rely on job titles and boundaries, this creates a culture in which individuals desire to protect themselves, eliminating loyalty to the organization as a whole, and slowing the ability to adapt and change (Heifetz et al., 2009). Adaptive leadership must be a shared process among individuals who believe in a common mission and goals (Raney, 2014). The result of bringing together these differences is creativity and innovation. This creates a culture of experimentation, where conflict is seen as a means towards creativity (Heifetz, 2011).

These constructs are the conditions that need to be in place in order for deeper technical and adaptive work to happen (Daly & Chrispeels, 2008). Changing the culture within a system is often difficult and yet, is the means to increasing student achievement (Taylor, 2010). This systemic change requires an organization to shift both their values and their beliefs (Adelman & Taylor, 2007). Some define this as recoding the DNA of the system (Nicolaides & McCallum, 2013). Rituals, actions, and protocols often tell a lot about the adaptive culture within a system. If the norms reinforce the status quo, the culture may not be as adaptive (Fowler, 2013). The greater the distance between the current culture and the desired culture, the more difficult the change in culture becomes (Adelman & Taylor, 2007). Eichholz (2014) referred to this as the organization's adaptive capacity. The larger the capacity an organization has, the easier it will be to implement adaptive changes. Movement towards a more adaptive culture requires leaders who are willing to invite others into the conversation, realizing that change is difficult, the outcome might be unknown, and what will be a constant is disappointing people; not everyone will be satisfied with the results (Raney, 2014). Emotion is part of human experience and therefore leadership cannot be separated from emotion (Drago-Severson et al., 2012). As these

conversations happen, as views are shared, the environment will begin to shift and a new culture will be born (Raney, 2014).

Heifetz (2009) explained this ability of a system to control its own fate as controllability. This is in contradiction to system vulnerability. Adaptive capacity (controllability) measures the system's ability to respond to the unexpected, both from the outside and internally (Fabac, 2010). Increasing this capacity requires schools to understand the importance of trust and relationships (Ruff & Shoho, 2005). Heifetz's (2009) constructs for adaptive culture allow organizations to confront past failures, especially those underlying issues (naming the elephant) that have previously prevented an organization from moving forward (Ruff & Shoho, 2005). While the leadership and culture that support technical problem-solving allow problems to be solved quickly, therefore providing more satisfaction, they ultimately fail over time, as stress and fatigue continue within the organization (Raney, 2014). Schools that are strong and healthy have a deep understanding of their mission and goals, succeed in meeting those goals, and are able to adapt and cope with demands both internally and externally (Ulin et al., 1998). These long-term goals are indicative of whether school improvement systemic changes have been effective (Adelman & Taylor, 2007).

Summary

Given the quickly changing demographics of school systems, along with demands from government mandates and school choice options, schools feel the pressure of systemic reform. The ability to adapt to changes in instruction, student demographics, and student learning needs, requires a leader and a system that has developed adaptive capacity. Technical solutions may provide quick fixes, but will not last over time nor will they provide the results required from school reform mandates.

Chapter III: Methodology

Introduction

This study was designed to determine what relationship, if any, exists between the adaptive culture in an elementary school and student proficiency achievement and student growth achievement. Research (Campbell-Evans, 2014; Daly & Chrispeels, 2008; Glatter, 2006; Kaiser, Hogan & Craig, 2008) demostrated a gap regarding the quantitative analysis of the impact of adaptive culture within elementary schools. Merriam (2009) suggested researchers address closing this gap between known and unknown.

Purpose

The purpose of this study was to explore what relationship, if any, exists between an elementary school's adaptive culture and student achievement proficiency and student achievement growth as measured by state-wide accountability testing, Minnesota Comprehensive Assessment. Since both reading and math are tested subjects at the elementary level, correlations were examined with both aggregated subject scores and disaggregated subject scores.

Research Method and Design

A quantitative survey design along with secondary data was utilized for this correlational study. The population included elementary principals and teacher leaders from elementary schools across Minnesota. For purposes of this study, the elementary school must have included grades three and four and have participated in state accountability testing in both the 2014-15 and 2015-16 school years. Principals and their leadership teams completed a survey that measured the five constructs of an adaptive culture. The survey was brief and was sent online, encouraging more participation.

Public student achievement and student growth data was collected from the Minnesota Department of Education's website. The two reports utilized included: Assessment and Growth

(both reading and math proficiency) and Multiple Measurement District Download (reading and math growth data, including student groups).

Research Questions

This study sought to address the following questions:

- Q1: What relationship, if any, exists between an elementary school's adaptive culture profile and student achievement proficiency?
    - H_{1o}: There is no relationship between adaptive culture within elementary schools and student achievement proficiency scores.
    - H_{1a}: There is a relationship between adaptive culture within elementary schools and student achievement proficiency scores.
    - $H1_{ao}$: There is no relationship between adaptive culture within elementary schools and math student achievement proficiency scores.
    - $H1_{aa}$: There is a relationship between adaptive culture within elementary schools and math student achievement proficiency scores.
    - $H1_{bo}$: There is no relationship between adaptive culture within elementary schools and reading student achievement proficiency scores.
    - $H1_{ba}$: There is a relationship between adaptive culture within elementary schools and reading student achievement proficiency scores.
- Q2: What relationship, if any, exists between an elementary school's adaptive culture profile and growth in student achievement?
    - H_{2o}: There is no relationship between an elementary school's adaptive culture and growth in student achievement.

- H_{2a}: There is a relationship between an elementary school's adaptive culture and growth in student achievement.
- $H2_{ao}$: There is no relationship between an elementary school's adaptive culture profile and growth in student math achievement.
- $H2_{aa}$: There is a relationship between an elementary school's adaptive culture profile and growth in student math achievement.
- $H2_{bo}$: There is no relationship between an elementary school's adaptive culture profile and growth in student reading achievement.
- $H2_{ba}$: There is a relationship between an elementary school's adaptive culture profile and growth in student reading achievement.

- Q3: What relationship, if any, exists between an elementary school's adaptive culture profile and the student achievement growth for students in poverty?
  - H_{3o}: There is no relationship between and elementary school's adaptive culture profile and student achievement growth scores for students in poverty.
  - H_{3a}: There is a relationship between and elementary school's adaptive culture profile and student achievement growth scores for students in poverty.
  - $H3_{a0}$: There is no relationship between an elementary school's adaptive culture profile and math student achievement growth for students in poverty.
  - $H3_{aa}$: There is a relationship between an elementary school's adaptive culture profile and math student achievement growth for students in poverty.
  - $H3_{b0}$: There is no relationship between an elementary school's adaptive culture profile and reading student achievement growth for students in poverty?

- $H3_{ba}$: There is a relationship between an elementary school's adaptive culture profile and reading student achievement growth for students in poverty?

Variables

The independent variable was the adaptive culture within elementary schools and the dependent variables were student achievement proficiency and student achievement growth for all students in both reading and math and for students living in poverty.

Instrumentation and Measures

This study required the use of two data sets. One set was student achievement and growth data available to the public from the Minnesota Department of Education. The other data set was collected from the Adaptive Culture Profile Scale (ACPS) completed by elementary school principals and their leadership team members.

Minnesota comprehensive assessments.

The MCA (Minnesota Comprehensive Assessment) is the state accountability test administered annually to students in grades three through high school. An outside agency used a panel process to evaluate the test items based on state standards alignment and content. The respective panels for both math and reading determined there is reasonable evidence for content validity for each assessment (Deatz, Smith, Thacker, Dickinson, Levinson, & Nemeth, 2013; Nemeth, Thacker, Deatz, Buckland, Fry, Hardoin, & Wiley, 2011).

Student achievement proficiency.

Student achievement proficiency data was collected from the Minnesota Department of Education website, utilizing the Assessment and Growth download file. This file allowed data to be downloaded by both reading and math subject areas. The file provided information regarding the number of students who performed in each of four proficiency areas: Does Not Meet,

Partially Meets, Meets, Exceeds. The report also provided a mean scale score for both reading and math in each grade level. For the purposes of this study, the mean scale scores for each grade level in the respective subject areas were aggregated into a mean scale score for that school, in either reading or math. Pearson r was then utilized to determine if a relationship exists between student achievement proficiency (mean scale score) and the adaptive culture within an elementary school.

Student achievement growth.

Student achievement growth data was gathered from the Minnesota Department of Education (www.education.state.mn.us), Multiple Measurement District Download, allowing delineation by school. The report provided information regarding student achievement growth in the form of z-scores. Z-scores are provided for reading, math, and as a combined (both reading and math). Reading and math z-scores were used individually by subject area, rather than combined. This report allowed for analysis of z-scores by student group. For the purposes of this study, aggregated school z-scores and the free and reduced population's z-score were analyzed. Schools with z-scores of zero were making average growth. Schools with positive z-scores were considered more than average growth, while those with negative z-scores were determined to be making less than average growth. Pearson r was utilized to determine if there is a relationship between z-scores (for the school, reading, math, and students in poverty) and adaptive culture.

Adaptive culture profile scale.

To measure the adaptive culture of the school, The Adaptive Culture Profile Scale, developed by Fowler (2013) was utilized. Written permission from the author to use the scale in its entirety had been gained (Appendix F), and the author requested to see findings upon completion of this study. The questions within the survey were quantitative in nature and

utilized a 6-point Likert scale. Five items on the survey were reverse scored. These are noted within the scoring guide located in Appendix B. The ACPS is based on the adaptive leadership framework developed by Heifetz and Linsky (2004). Linsky served as a consultant during the development of the scale. The 6-point Likert scale measures an organization's adaptive culture, focusing on both the boss (principal) and the team (leadership team). The scale consists of five constructs:

1. Elephants are Named – School leaders name the elephants in the room or identify problems or conflict sources within the school.
2. Independent Judgment is Exercised - Leaders are able to practice independent judgment within their daily work.
3. Leadership is Developed – The culture of the school is supportive of developing teacher leaders.
4. Reflection and Learning is Encouraged – School leaders are encouraged to frequently reflect and learn on their experiences.
5. Responsibility for the Organization is Shared - Principals and teacher leaders share the responsibility of their work and development of the school culture.

Fowler (2013) provided reliability data for the ACPS. In regards to re-test reliability, the ACPS provided a positive correlation for both the boss factor ($r=.785$, $p<.01$) and the team factor ($r=.726$, $p<.01$). Using Cronbach's alpha to analyze the factor reliability, the boss factor had a rating of .957 and the team factor had a rating of .933. Through factor analysis, 49 of the 52 variables correlated with one other variable in excess of .30. The sampling adequacy measured .935. Bartlett's Test of Sphericity was noted to be significant and communality loaded about .30

for all but one variable. Finally, there was no danger of multicollinearity reported as none of the 52 variables loaded over .90.

Sampling Design

The MESPA website lists 1,002 organizational members in the state of Minnesota. This study sample did not include urban principals due to the permission processes and lengthy timeframes required by most large, urban school districts. MESPA organizes principals in 12 divisions. Eight divisions comprised the sample for this study, with the removal of four urban divisions. Email addresses for the sample members were obtained from the MESPA website. An initial invitation to participate in the study was sent to 567 active principals from the eight divisions (Appendix C). This first email generated responses from 64 members. Of those responses, 22 agreed to participate. The other 42 either declined participation or shared information indicating their school did not match the participation criteria. A second letter to participate was sent electronically to 503 members within the selected divisions. The second email received 16 agreements to participate. Of the 38 who initially agreed to participate, five principals did not provide contact information for leadership team members. Surveys were sent to principals and their team members from 33 schools. Of those 33 schools, 30 had at least two participants complete the survey (n=30). The response rate for this survey was 5.29 percent (30/567*100=5.29%).

Data Collection

Survey data.

An introductory letter was sent via email to all active elementary principals within the eight nonurban divisions, obtained from the MESPA website. A copy of the original letter of interest that was sent to principals can be found in Appendix C. Principals had two weeks to

respond with their intent to participate and provide the names and email addresses of at least two teacher leaders who were willing to participate in the survey. After one week had passed, a reminder was sent to all potential MESPA elementary principals who had not yet responded (Appendix D). After the two-week timeframe, survey links were sent to all participants via Qualtrics. Surveys were coded by school so responses for that school could be aggregated into one school adaptive culture score without directly identifying the school. Participants were given two weeks to complete the survey. After one week, a reminder was sent via Qualtrics to any participant who had not yet completed the survey. Appendix E is a copy of the consent form given to participants who chose to participate in this study.

Secondary data.

School proficiency and growth z-scores were obtained from the Department of Education's public website after the Qualtrics survey had been completed. Documents entitled Multiple Measurement District Download and Assessment and Growth were downloaded and data was extracted. From the Multiple Measurement District Download, z scores for reading, math, and students in poverty were extracted.

Data Analysis

This was a correlational research design. Due to a low response rate of 5.29%, a test was run after data was collected to determine if data was normally distributed. Data was determined to be normally distributed, and Pearson -r was then used to analyze the results. Pearson –r is a method used to analyze the relationship between two continuous variables. Pearson –r coefficients vary between -1 and +1. These coefficients suggest the type of relationship between the variables. A coefficient of +1 indicates a positive relationship (high score on adaptive culture = a high score on student achievement proficiency or growth). A coefficient of -1 indicates a

negative relationship (high score on adaptive culture = a low score on student achievement proficiency or growth). A coefficient of 0 indicates no relationship. In addition to the direction of the relationship, Pearson –r also determines the strength of the relationship. The closer to positive or negative one, the stronger the relationship (Muijs, 2011).

The unit of analysis within this study was the school. The independent variables were measures of adaptive culture. The measure of adaptive culture were aggregated for one overall school score. The higher the score, the higher the adaptability. The score can also be disaggregated by "boss" and "team" factors or by the five constructs of the survey, although this disaggregation was not be part of this study. The dependent variables were student achievement proficiency as measured by MCA scale score and achievement growth as measured by MCA z-scores. Being able to match a school's adaptive culture score to its student achievement proficiency and student achievement growth data was necessary in order to determine if there was a relationship between the two. Each school participating in this research was given a code. That code was used to identify and match adaptive culture data, student achievement proficiency and student achievement growth. These codes were kept confidential and stored separately from the remainder of the data to ensure confidentiality of all data collected.

Pilot Test

The Adaptive Culture Profile scale consists of 48 statements in which the participant marks their response on a 6-point Likert Scale. The total of the profile provides insight into the adaptive capacity of the organization. The higher the score, the more adaptive the organization is perceived to be. A Qualtrics survey consisting of the 48 statements was sent to 19 people within two organizations who were not potential participants in the actual research. Of the 19 invited to participate in this pilot test, all 19 responded. The survey was sent in February 2017. Participants

were given one week to complete the survey, and all completed the survey within that timeframe. Of the 19 participants, six were from a non-school organization. Field test participants provided feedback to the researcher regarding understanding of the ACPS, flow of the survey within Qualtrics, accessibility, and general survey comments. Participants reported the survey was easy to access, took approximately 15 minutes to complete, and was understandable. One misspelling was noted and corrected.

Limitations and Delimitations

Limitations.

Limitations were present in this study. The use of a survey design creates limitations. First, those who responded to the surveys tended to be those who are interested in the topic of study or research in general. This led to a lower response rate. Both the desire to participate and the lower response rate, made it challenging to generalize the results from a survey study (Muijs, 2011).

The use of a survey does not allow the researcher to control the environment or develop a deeper understanding of the relationship (Muijs, 2011). A quantitative survey combined with qualitative questions would have provided an opportunity for the survey to gather more in-depth responses. The use of a survey within this study is as a self-report. Muijs (2011) stated self-report surveys can be less reliable as subjects may report what they wish to be true, rather than their reality. This study collected self-reports from the elementary principal and at least two teacher leaders. These scores were then aggregated to create one school adaptive culture score. This combination of perspectives was intended to provide a more accurate report of a school's adaptive culture. The principal might have been inclined to ask only those teachers who would respond positively to complete the survey.

Tschannen-Moran and Gareis (2014) suggested that student learning is most often based on student achievement. There are benefits to using standardized test scores, most notably their validity and reliability. They also suggested the use of standardized test scores narrows the range of intended learning outcomes and may simplify the learning that actually happens within a school.

Delimitations.

This study did not include non-public, charter, middle, or high schools, or those elementary schools that did not have at least two grades that participated in state accountability testing. Principals in Minnesota who are not a member of MESPA were excluded from participating. This narrowed the scope of the study. Participants may have chosen to participate due to positive student achievement. Likewise, they may have chosen not to participate due to lack of student achievement, thus potentially skewing the results.

Ethical Considerations

This study adhered to the principles within the Belmont Report (U.S. Department of Health & Human Services [HHS], 1979). Respect for persons, justice and beneficence, and ethical decision making guided the planning and conducting of this study.

Selection of individuals for this study was based on their relationship to the problem. No bias was present in the selection of individuals nor were any subjects coerced in participating in this study. Privacy and respect was provided to all individuals through coding of the survey data and the secondary data by school. Codes for schools were kept separate from all data gathered. Further, the online survey did not trace IP addresses. Data was kept confidential and will only be used for this study. Given these measures, there was minimal risk to any participant who chose to engage in this study.

Beneficence is defined as having the best interest of the research participants in mind (HHS, 1979). This was a voluntary study. The study's language, as well as in the reporting of the study, sought to be non-biased. There was fairness of distribution (HHS, 1979) within this study as it did not benefit one group nor deny another group of privilege. Justice was upheld in this study as it sought to maximize the common good for all so that all educational leaders may benefit.

Consent to participate in this study was included as the first question within the online survey. The consent was clear and explained the risk and voluntary nature of the study. Participants could not participate in the study without as assessment of comprehension. A copy of the consent was included in Appendix E.

After proposal approval by the dissertation advisor and readers, the researcher applied for Institutional Review Board (IRB) approval from the Bethel University IRB Committee and was granted such approval. Compliance with IRB regulations required the study to comply with equitable selection of subjects, minimization of harm to subjects, informed and voluntary consent, and confidentiality.

Chapter IV: Results

Introduction

The purpose of this study was to explore what relationship, if any, exists between the adaptive culture of an elementary school and student achievement and student growth. Data for this study was gathered through the use of the Adaptive Culture Profile Scale, sent via Qualtrics survey, and Minnesota Comprehensive Assessment public reporting. Both sets of data were quantitative.

The researcher collaborated with personnel from the St. Cloud State University's Statistical Consulting and Research Center to analyze the data using the Statistical Package of the Social Sciences (SPSS). Assumptions were tested to be sure the data could be used in this study. None of the data failed the assumptions and a Pearson –r was then used to measure a correlation. This chapter contains a discussion of the analysis results including the assumptions and the correlations.

Sample

Contact information for this study's sample was collected from the Minnesota Elementary School Principal Association's (MESPA) website (www.mespa.net). On April 15, 2017, the website showed 1,002 records of members (principals). An offer to participate was sent via email to 567 MESPA members (Appendix C). Members with a status other than active, or those who were listed as being members of the West Suburban, Minneapolis, St. Paul, and South Suburban region were not included. The first email sent by the researcher generated responses from 64 members. Of those responses, 22 agreed to participate. The other 42 either declined participation or stated their school did not match the participation criteria (Grades three and four, public, non-charter). A second email containing an offer to participate (Appendix D) was sent to

503 members. After the second email, an additional 16 members agreed to participate. Codes were generated in Qualtrics for 38 schools. Of those 38, five principals did not provide team contact information. Surveys were sent to teams from 33 schools. Of those 33 schools, 30 schools had at least two participants complete the survey (n=30). The Minnesota Department of Education will not report student achievement or growth data if a cell size is less than 10. One school had fewer than 10 students when proficiency scores were reported by subject area. The sample size for math proficiency and reading proficiency is 29 (n=29). A school had fewer than 10 students receiving free and reduced lunch. The sample size for poverty math z scores and poverty reading z scores is 29 (n=29).

Assumptions

Pearson's r assumes linear relationships between variables (Muijs, 2011). Linear relationships are indicated when higher scores on X are related to higher scores on Y. Linearity can be diagnosed using the P-P plot. The assumption of linearity is met when the P-P plot displays normal distribution, with X and Y being equal to or less than 1.0.

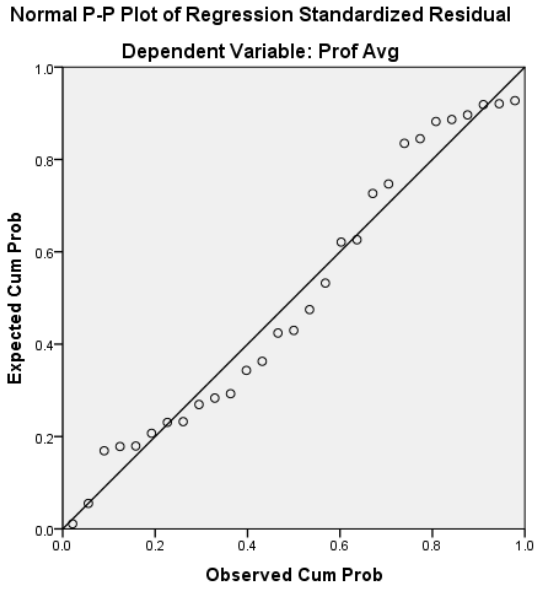

Figure 1. Normal P-P Plot of ACPS and student achievement proficiency. This figure illustrates a near linear relationship between ACPS and student achievement proficiency.

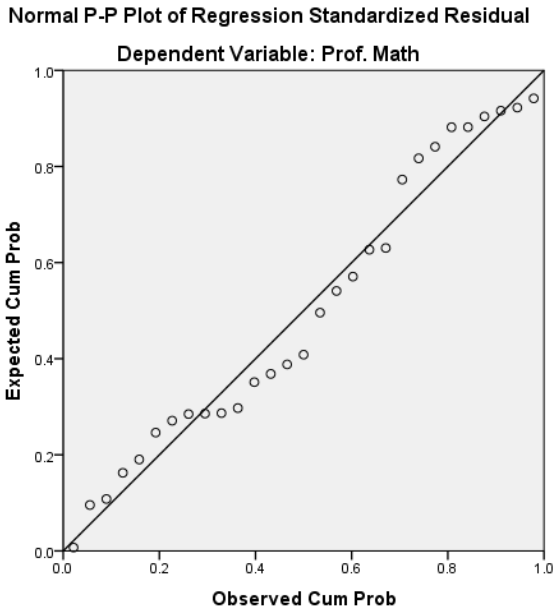

Figure 2. Normal P-P Plot of ACPS and math student achievement. This figure illustrates a linear relationship between ACPS and math student achievement.

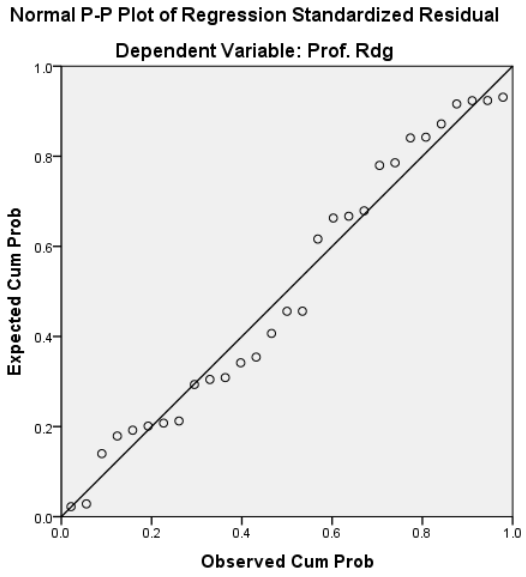

Figure 3. Normal P-P Plot of ACPS and student reading proficiency. This figure illustrates a linear relationship between ACPS and reading student achievement.

Likewise, P-P plots for hypothesis two and all sub hypotheses demonstrate a linear relationship between ACPS and average z-score, ACPS and math z-scores, and ACPS and reading z-scores.

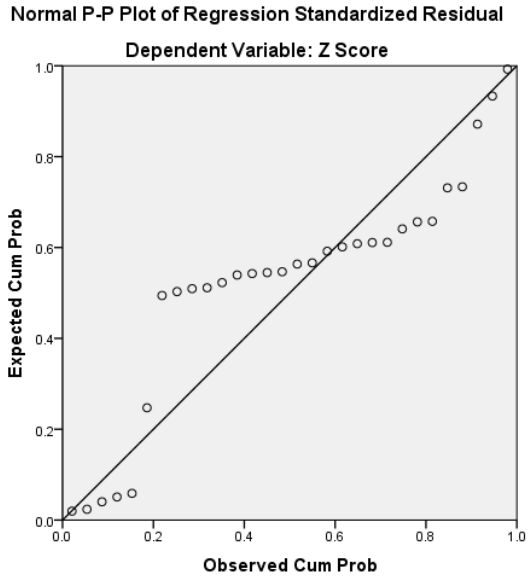

Figure 4. Normal P-P Plot of ACPS and average z-scores. This figure illustrates a less linear relationship between ACPS and average z-scores.

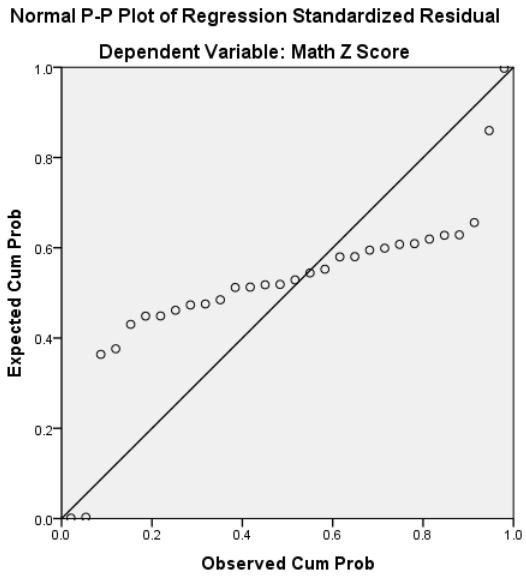

Figure 5. Normal P-P Plot of ACPS and math z-scores. This figure illustrates a less linear relationship between ACPS and math z-scores.

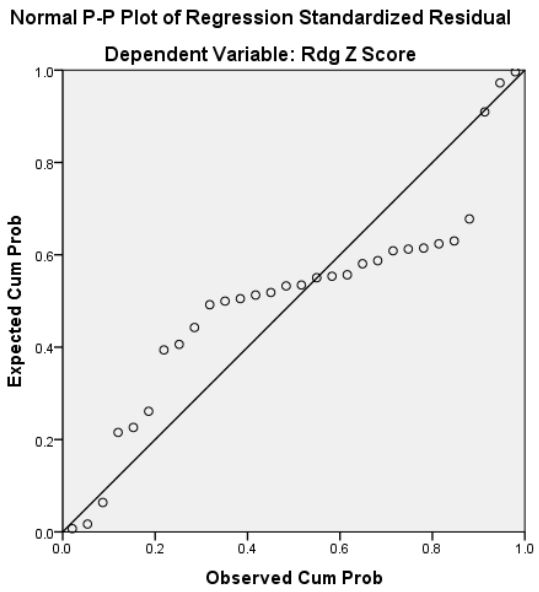

Figure 6. Normal P-P Plot of ACPS and reading z-scores. This figure illustrates a less linear relationship between ACPS and reading z-scores.

Hypothesis three and its sub-hypotheses also all demonstrated linearity between ACPS and average poverty z-scores, ACPS and poverty math z-scores, and ACPS and poverty reading z-scores.

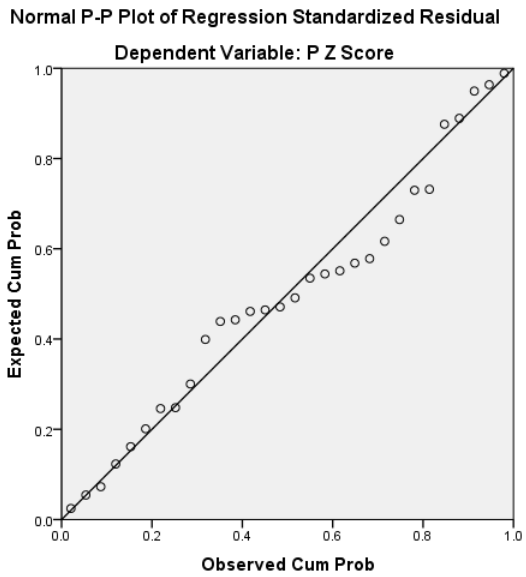

Figure 7. Normal P-P Plot of ACPS and poverty z-scores. This figure illustrates a linear relationship between ACPS and poverty z-scores.

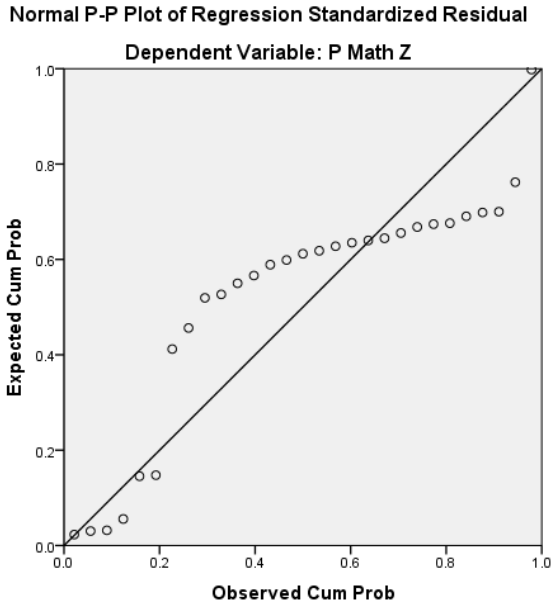

Figure 8. Normal P-P Plot of ACPS and poverty math z-scores. This figure illustrates a less linear relationship between ACPS and poverty math z-scores.

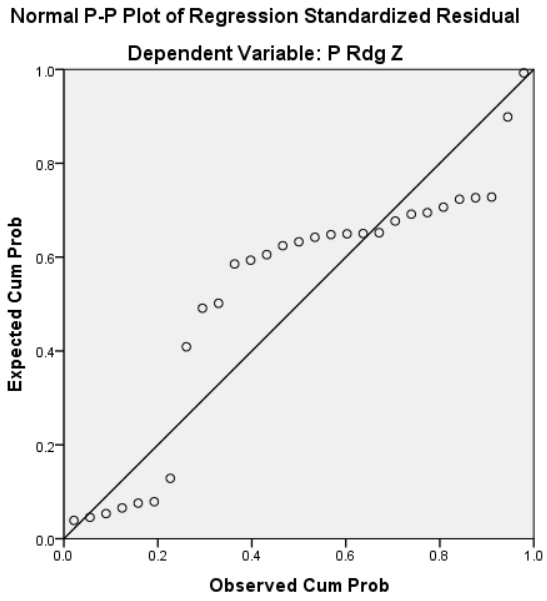

Figure 9. Normal P-P Plot of ACPS and poverty reading z-scores. This figure illustrates a less linear relationship between ACPS and poverty reading z-scores.

Homoscedasticity.

Homoscedasticity ensures the variance around the regression line is the same for all the values of the predictor variable (x). This assumption can be checked by analysis of a scatterplot. All values within the scatterplot should be evenly distributed. A scatterplot for each hypothesis and sub-hypothesis can be found in Appendix G. All scatterplot graphs suggested the data was relatively normal, as all data was within + or – 3. No outliers were present. The analysis of regression addresses the potential limitations of the correlation coefficient and provides greater confidence in the results that follow.

Correlation

Hypothesis one.

The null hypothesis (H_{1o}) was that there is no relationship between adaptive culture within elementary schools and student achievement proficiency scores. The alternative

hypothesis (H_{1a}) was that there is a relationship between adaptive culture within elementary schools and student achievement proficiency scores. A correlation between the ACPS responses and student achievement proficiency scores was completed. The sample size was 29 (n=29). The alpha level used to test the significance of the relationship was $p < .05$. For this test, the r coefficient was .15. The relationship between the ACPS and student achievement proficiency showed no relationship in their correlation ($r = .150$) and since the Sig. (2-tailed) was .436 these results were not deemed statistically significant. The null hypothesis was unable to be rejected. There was no relationship between adaptive culture within elementary schools and student achievement proficiency scores.

Table 1

Correlation of Average Proficiency and ACPS

Correlations

		Prof Avg	ACPS
Prof Avg	Pearson Correlation	1	.150
	Sig. (2-tailed)		.436
	N	35	29
ACPS	Pearson Correlation	.150	1
	Sig. (2-tailed)	.436	
	N	29	30

The first sub null hypothesis (H_{1ao}) was that there was no relationship between adaptive culture within elementary schools and math student achievement proficiency scores. The alternative hypothesis (H_{1aa}) was that there was a relationship between adaptive culture within elementary schools and math student achievement proficiency scores. A correlation between the ACPS responses and math student achievement proficiency scores was completed. The sample size was 29 (n=29). The alpha level used to test the significance of the relationship was $p < .05$. For this test, the r coefficient was .13. There was no relationship between ACPS and math student achievement proficiency ($r = .131$) and since the Sig. (2-tailed) is .499, these results were

not deemed statistically significant. The null hypothesis was not rejected because no relationship was found.

Table 2

Correlation of Math Proficiency and ACPS

Correlations

		ACPS	Prof. Math
ACPS	Pearson Correlation	1	.131
	Sig. (2-tailed)		.499
	N	30	29
Prof. Math	Pearson Correlation	.131	1
	Sig. (2-tailed)	.499	
	N	29	35

The second sub null hypothesis (H_{1bo}) was that there was no relationship between adaptive culture within elementary schools and reading student achievement proficiency scores. The alternative hypothesis (H_{1ba}) was that there was a relationship between adaptive culture within elementary schools and reading student achievement proficiency scores. A correlation between the ACPS responses and reading student achievement proficiency scores was completed. The sample size was 29 (n=29). The alpha level used to test the significance of the relationship was $p < .05$. For this test, the r coefficient was .16. There was no relationship between the ACPS and reading student achievement proficiency ($r = .164$) and since the Sig. (2-tailed) was .394, these results were not deemed statistically significant. The null hypothesis was not rejected because no relationship was found.

Table 3

Correlation of Reading Proficiency and ACPS

Correlations

		Prof. Rdg	ACPS
Prof. Rdg	Pearson Correlation	1	.164
	Sig. (2-tailed)		.394
	N	35	29
ACPS	Pearson Correlation	.164	1
	Sig. (2-tailed)	.394	
	N	29	30

Hypothesis Two

The null hypothesis (H_{2o}) was that there was no relationship between adaptive culture within elementary schools and growth in student achievement. The alternative hypothesis (H_{2a}) was that there is a relationship between adaptive culture within elementary schools and growth in student achievement. A correlation between the ACPS responses and z-scores was completed. The sample size was 30 (n=30). The alpha level used to test the significance of the relationship was $p < .05$. For this test, the r coefficient was .17. There was no relationship between the ACPS and z-scores ($r = .150$) and since the Sig. (2-tailed) was .360, these results were not deemed statistically significant. The null hypothesis was not rejected because no relationship was found.

Table 4

Correlation of Average Z Score and ACPS

Correlations

		Z Score	ACPS
Z Score	Pearson Correlation	1	.173
	Sig. (2-tailed)		.360
	N	36	30
ACPS	Pearson Correlation	.173	1
	Sig. (2-tailed)	.360	
	N	30	30

The first sub null hypothesis (H_{2ao}) was that there was no relationship between adaptive culture within elementary schools and growth in student math achievement. The alternative hypothesis (H_{2aa}) was that there was a relationship between adaptive culture within elementary schools and growth in student math achievement. A correlation between the ACPS responses and math z-scores was completed. The sample size was 30 (n=30). The alpha level used to test the significance of the relationship was $p < .05$. For this test, the r coefficient was .08. There was no relationship between the ACPS and math z-scores ($r = .075$) and since the Sig. (2-tailed) was .692, these results were not deemed statistically significant. The null hypothesis was not rejected because no relationship was found.

Table 5

Correlation of Math Z Score and ACPS

Correlations

		ACPS	Math Z Score
ACPS	Pearson Correlation	1	.075
	Sig. (2-tailed)		.692
	N	30	30
Math Z Score	Pearson Correlation	.075	1
	Sig. (2-tailed)	.692	
	N	30	36

The second sub null hypothesis (H_{2bo}) was that there was no relationship between adaptive culture within elementary schools and growth in student reading achievement. The alternative hypothesis (H_{2ba}) was that there was a relationship between adaptive culture within elementary schools and growth in student reading achievement. A correlation between the ACPS scores and reading z-scores was completed. The sample size was 30 (n=30). The alpha level used to test the significance of the relationship was $p < .05$. For this test, the r coefficient was -.25. There was no relationship between the ACPS and reading z-scores ($r = -.254$) and since the Sig.

(2-tailed) was .176, these results were not deemed statistically significant. The null hypothesis was not rejected because no relationship was found.

Table 6

Correlation of Reading Z Score and ACPS

Correlations

		Rdg Z Score	ACPS
Rdg Z Score	Pearson Correlation	1	-.254
	Sig. (2-tailed)		.176
	N	36	30
ACPS	Pearson Correlation	-.254	1
	Sig. (2-tailed)	.176	
	N	30	30

Hypothesis Three

The null hypothesis (H_{3o}) was that there was no relationship between adaptive culture within elementary schools and student achievement growth scores for students in poverty. The alternative hypothesis (H_{3a}) was that there was a relationship between adaptive culture within elementary schools and student achievement growth scores for students in poverty. A correlation between the ACPS responses and z-scores for students in poverty was completed. The sample size was 30 (n=30). The alpha level used to test the significance of the relationship was $p < .05$. For this test, the r coefficient was .25. There was no relationship between the ACPS and poverty z-scores ($r = .251$) and since the Sig. (2-tailed) was .18, these results were not deemed statistically significant. The null hypothesis could not be rejected because no relationship was determined.

Table 7

Correlation of Poverty Z Scores and ACPS

Correlations

		P Z Score	ACPS
P Z Score	Pearson Correlation	1	.251
	Sig. (2-tailed)		.180
	N	70	30
ACPS	Pearson Correlation	.251	1
	Sig. (2-tailed)	.180	
	N	30	30

The first sub null hypothesis (H_{3ao}) was that there was no relationship between adaptive culture within elementary schools and math student achievement growth scores for students in poverty. The alternative hypothesis (H_{3aa}) was that there was a relationship between adaptive culture within elementary schools and math student achievement growth scores for students in poverty. A correlation between the ACPS responses and math z-scores for students in poverty was completed. The sample size was 29 (n=29). The alpha level used to test the significance of the relationship was $p < .05$. For this test, the r coefficient was -.18. There was no relationship between ACPS and math poverty z-scores ($r = -.177$) and since the Sig. (2-tailed) was .358, these results were not deemed statistically significant. The null hypothesis was not rejected because no relationship was found.

Table 8

Correlation of Poverty Math Z Scores and ACPS

Correlations

		ACPS	P Math Z
ACPS	Pearson Correlation	1	-.177
	Sig. (2-tailed)		.358
	N	30	29
P Math Z	Pearson Correlation	-.177	1
	Sig. (2-tailed)	.358	
	N	29	35

The second sub null hypothesis (H_{3bo}) was that there was no relationship between adaptive culture within elementary schools and reading student achievement growth scores for students in poverty. The alternative hypothesis (H_{3ba}) was that there was a relationship between adaptive culture within elementary schools and reading student achievement growth scores for students in poverty. A correlation between the ACPS responses and reading z-scores for students in poverty was completed. The sample size was 29 (n=29). The alpha level used to test the significance of the relationship was $p < .05$. For this test, the r coefficient was -.13. There was no relationship between ACPS and reading poverty z-scores ($r = -.132$) and since the Sig. (2-tailed) was .494, these results were not deemed statistically significant. The null hypothesis was not rejected because no relationship was found.

Table 9

Correlation of Poverty Reading Z Scores and ACPS

Correlations

		P Rdg Z	ACPS
P Rdg Z	Pearson Correlation	1	-.132
	Sig. (2-tailed)		.494
	N	35	29
ACPS	Pearson Correlation	-.132	1
	Sig. (2-tailed)	.494	
	N	29	30

Summary of Findings

Table 10

Hypotheses and Findings

Hypothesis	r coefficient	Sig (2-tailed)
H_{1o} There is no relationship between adaptive culture within elementary schools and student achievement proficiency scores.	.15	.436
H_{1ao} There was no relationship between adaptive culture within elementary schools and math student achievement proficiency scores.	.13	.499
H_{1bo} There was no relationship between adaptive culture within elementary schools and reading student achievement proficiency scores.	.16	.394
H_{2o} There was no relationship between adaptive culture within elementary schools and growth in student achievement.	.17	.360
H_{2ao} There was no relationship between adaptive culture within elementary schools and growth in student math achievement.	.08	.692
H_{2bo} There was no relationship between adaptive culture within elementary schools and growth in student reading achievement.	-.25	.176
H_{3o} There was no relationship between adaptive culture within elementary schools and student achievement growth scores for student in poverty.	.25	.18
H_{3ao} There was no relationship between adaptive culture within elementary schools and math student achievement growth scores for students in poverty.	-.18	.358
H_{3bo} There was no relationship between adaptive culture within elementary schools and reading student achievement growth scores for students in poverty.	-.13	.494

Chapter V: Discussion, Implications, Recommendations

Overview of the Study

The purpose of this study was to explore whether an elementary school's adaptive culture is related to student achievement proficiency and student achievement growth as measured by statewide accountability testing. The research utilized a Likert scale within the Adaptive Culture Profile Survey (ACPS) to determine an aggregated adaptive score for each elementary school. Pearson's –r correlation was then used to determine if a relationship existed between the ACPS score and proficiency scores for reading and math, growth z-scores for reading and math, and poverty growth z-scores for reading and math. Three hypotheses with two sub hypotheses each and their alternatives were proposed. Chapter Five reviews this study and addresses future implications.

Research Questions

Three main questions were addressed within this study:

- Q1: What relationship, if any, exists between an elementary school's adaptive culture profile and student achievement proficiency?
- Q2: What relationship, if any, exists between an elementary school's adaptive culture profile and growth in student achievement?
- Q3: What relationship, if any, exists between an elementary school's adaptive culture profile and student achievement growth for students in poverty?

Hypotheses

There were three hypotheses with two sub hypotheses (six total), along with three alternative hypotheses and two sub alternative hypotheses each (six total) proposed within this study. None of the null hypotheses were rejected.

Conclusions

Data analysis found the adaptive culture within an elementary school has no relationship to student achievement proficiency and student achievement growth. Given previous adaptive culture research (Eichholz, 2014; Heifetz & Linksy, 2004; Taylor & LaCava, 2011; Tschannen-Moran & Gareis, 2014; Waters et al., 2004) and anecdotal observations from the field, a relationship was expected. However, after Pearson –r was completed, the *p* value was found to greater than .05, thus the null hypotheses were accepted and no relationship exists between the variables within the study.

The correlations determined for the relationships between ACPS and reading growth z-scores as well as between ACPS and poverty growth z-scores had the largest coefficients, thus the weakest correlation within the study. There were also several correlation coefficients that were negative. If a relationship had been determined, this would have been a negative relationship, meaning the greater the adaptive culture, the lower the student achievement or student growth. This is quite contrary to what was expected based on previous adaptive culture research. These findings might reflect the small sample size of this study. While the invitation to participate within the study was sent to a large number of elementary schools, the response rate was quite small. Some of those who chose not to participate reported being too busy with other tasks, or had already committed to participating in another study. The survey was sent in the spring of the school year. Participation rates may have been higher if the survey were sent at a time of year when educators felt less busy. One principal reported carving time out during a meeting for the leadership team to take the survey. Participation rates for members from that school were 100 percent. That process may be helpful for future studies involving surveys and educators. Several of the schools that had high participation rates were schools in which the

researcher has an established relationship with the principal. The principal may have been more inclined to have their team participate, due to that relationship.

Implications and Recommendations

There continues to be a lack of academic studies exploring the relationship of adaptive leadership and student academic performance. Most current adaptive literature focuses on business or healthcare industries. Meanwhile, the importance of leading complex change within educational settings is a popular topic within schools. School reform and the ability to be innovative in creating educational systems remains in the forefront for leaders within education. This suggests a gap remains between what research hypothesizes about adaptive culture and what research has discovered about adaptive culture in the school setting. According to Eichholz (2014), school systems are by nature very technical systems. Many of the results within this study provide middle of the road scores. This could be reflective of the need for all schools to become more adaptive.

The ACPS can be divided into five components, each representing a piece of adaptive culture. Scores for each of the five structures within this study appeared as follows:

Table 11

Construct Average Scores

Adaptive Culture Construct	**Average Score** (Max. 6)
Elephants are Named	4.0
Independent Judgment	4.3
Reflection	4.2
Shared Responsibility	4.1
Leadership is Encouraged	4.4

Most of the average scores for each construct are similar. The construct with the lowest average score was Elephants are Named. The less apt a participant is to name the elephant within their

school could cause pause to inquire if participants were honest in the completion of the ACPS. It is anticipated that the anonymous, private administration of the ACPS resulted in valid responses. There is not a large discrepancy between individual construct scores. No score is near zero, likewise, no score is near the maximum of six. It appears from analysis of individual construct scores that each construct is somewhat average. Perhaps no correlation was found between the ACPS and student achievement as all participating schools are average in their adaptive capacity.

The questions on the ACPS can also be analyzed by constructs that apply to the team and constructs that apply to the boss (principal). When scores are disaggregated by team and boss, the average score for the team constructs was determined to be 3.97 (max of 6). The average score for the boss constructs was determined to be 4.34 (max of 6). A future study might consider the relationship between a principal's adaptive leadership and the school or team's adaptive skillset. A qualitative study might lend itself nicely to interviews and observations with principals who score high on the boss constructs. The interviews and observations might seek to identify daily actions and decisions that display adaptive leadership. This suggests further inquiry could also be done regarding the adaptive culture of teams within schools. A true experimental study focusing on the adaptive culture of a team prior to receiving professional development regarding adaptive culture and after receiving adaptive culture professional development might provide some insight regarding how a team develops and the benefits or negative aspects of such focus.

This study focused on adaptive culture and student achievement within public elementary schools in Minnesota. The sample size (n=30) for this study was small given the larger number of potential participants. Further studies could be completed with a larger sample size by

including additional grade levels, larger metro districts, or additional states. The survey could also be completed by all staff members, rather than those from a leadership team chosen by the principal. This study sought to find the relationship between adaptive culture and student achievement. Future studies might consider a relationship between adaptive culture and other measures within a school such as teacher retention or student culture/climate surveys.

Concluding Comments

The case for adaptive culture within the business and healthcare fields is clear and research supports such a cause. Within education, research regarding adaptive culture is lacking. School reform has intended to change how education is conducted throughout the United States. However, we continue to create systems that are similar to the educational systems from hundreds of years ago. Adaptive culture research suggests the need for creating adaptive cultures within educational systems in order to best serve the changing demographics of the student population, as well as our global economy. Further research is needed regarding the impact of adaptive culture within educational settings.

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Appendix A

Adaptive Culture Profile

In responding to the survey items below, think about yourself and your fellow direct reports. Do your best to represent the views of the collective group. When "we," "us," or "our" are used in the survey, the reference is to the collective group of direct reports for whom you are striving to represent the collective views. "Team meetings" refers to your boss, you and your fellow direct reports.

Please use the rating scale below to answer the following questions by circling the number that best describes your level of agreement or disagreement with each statement.

1	2	3	4	5	6
Strongly Disagree	Disagree	Mildly Disagree	Mildly Agree	Agree	Strongly Agree

1.	We avoid talking about difficult issues.	1	2	3	4	5	6
2.	Our boss delegates authority to us.	1	2	3	4	5	6
3.	We are encouraged to extract lessons from experiments – both successes and failures.	1	2	3	4	5	6
4.	Recognition is based on team performance as well as individual performance.	1	2	3	4	5	6
5.	We tell one another the truth about what we see happening.	1	2	3	4	5	6
6.	We do our job and do not ask questions.	1	2	3	4	5	6
7.	Our boss openly discusses failures as well as successes with us.	1	2	3	4	5	6
8.	We work well together in using our talents to advance the work.	1	2	3	4	5	6
9.	Our team climate encourages risk taking.	1	2	3	4	5	6
10.	We are willing to challenge our boss's perspectives if we think it is important for the work.	1	2	3	4	5	6
11.	Our boss is committed to our development as leaders.	1	2	3	4	5	6
12.	Our boss rewards learning from our failures.	1	2	3	4	5	6
13.	We work in our unit, but we don't feel we are responsible for its success.	1	2	3	4	5	6
14.	In team meetings, we identify tough issues that need to be discussed.	1	2	3	4	5	6
15.	Our boss encourages us to watch for signs of him/her rushing to a quick fix to a problem.	1	2	3	4	5	6
16.	We are encouraged to seize opportunities to take initiative.	1	2	3	4	5	6
17.	Our boss encourages us to take time out of our workday for reflection and learning.	1	2	3	4	5	6
18.	Departments share resources across boundaries for the common good of the work unit.	1	2	3	4	5	6
19.	In team meetings, we discuss the sensitive issues simmering under the surface.	1	2	3	4	5	6
20.	Worrying about our boss's expectations causes us to second guess our decisions.	1	2	3	4	5	6
21.	We are encouraged to exercise leadership beyond our job description.	1	2	3	4	5	6
22.	We play a significant role in helping set the vision for the work unit.	1	2	3	4	5	6
23.	In team meetings, we embrace the voices of dissenters.	1	2	3	4	5	6
24.	Our boss lets us know that he/she does not have all of the answers.	1	2	3	4	5	6
25.	My boss has been very clear with me about my potential for growth within the unit and beyond.	1	2	3	4	5	6
26.	Our boss asks deep questions about opportunities and issues facing our team's long term success.	1	2	3	4	5	6

Adaptive Culture Profile

In responding to the survey items below, think about yourself and your fellow direct reports. Do your best to represent the views of the collective group. When "we," "us," or "our" are used in the survey, the reference is to the collective group of direct reports for whom you are striving to represent the collective views. "Team meetings" refers to your boss, you and your fellow direct reports.

Please use the rating scale below to answer the following questions by circling the number that best describes your level of agreement or disagreement with each statement.

1	2	3	4	5	6
Strongly Disagree	Disagree	Mildly Disagree	Mildly Agree	Agree	Strongly Agree

27.	When problems arise, we own up to our share of responsibility for the mess.	1	2	3	4	5	6
28.	If we sense there is an "elephant in the room," one or several group members develop a way to bring attention to it.	1	2	3	4	5	6
29.	Our boss encourages us to "do the right thing" rather than simply please him/her.	1	2	3	4	5	6
30.	Our boss encourages us to have a professional development plan that is tailored to us individually.	1	2	3	4	5	6
31.	At the end of a meeting, we take a few minutes to reflect on how the meeting went.	1	2	3	4	5	6
32.	We pitch in to help each other around deadlines and deliverables.	1	2	3	4	5	6
33.	In team meetings, we become curious about minority points of view and want to hear more.	1	2	3	4	5	6
34.	Our boss encourages independent thinking by giving work back to us.	1	2	3	4	5	6
35.	We encourage each other to take leadership on the issues that matter most to us.	1	2	3	4	5	6
36.	After every project or initiative ends, the whole team meets to assess it and to clarify what we learned.	1	2	3	4	5	6
37.	We tend to think only about, and take responsibility for, our particular work unit.	1	2	3	4	5	6
38.	When someone tries an experiment that doesn't work so well, our boss protects us from his/her superiors.	1	2	3	4	5	6
39.	We are responsible for the risks we take as we exercise leadership to advance work we care about.	1	2	3	4	5	6
40.	When any member of the team learns something important, that information and learning is systematically shared throughout the work unit.	1	2	3	4	5	6
41.	At our team meetings, we each express opinions on issues that fall outside of our individual scopes of responsibility.	1	2	3	4	5	6
42.	Our boss seeks our advice.	1	2	3	4	5	6
43.	We have a culture that is open to discussing failures as well as celebrating successes.	1	2	3	4	5	6
44.	If you videotaped our team meetings, you would not know who the boss is.	1	2	3	4	5	6
45.	Our boss readily acknowledges when he/she does not know the answer to a problem.	1	2	3	4	5	6
46.	Our culture rewards time for reflection and learning.	1	2	3	4	5	6
47.	When someone takes a reasonable risk in the service of the mission and it doesn't work out, we use it as a learning opportunity - not an opportunity for criticism or punishment.	1	2	3	4	5	6
48.	We are prepared to have honest conversations with our boss, even if we think he/she will disagree with us.	1	2	3	4	5	6

Appendix B

Adaptive Culture Profile Survey

Scoring Guide

Each item of the ACPS was presented as a statement, followed by six categories for response:

- Strongly Disagree (1)
- Moderately Disagree (2)
- Mildly Disagree (3)
- Mildly Agree (4)
- Moderately Agree (5)
- Strongly Agree (6)

To score the scale, the 48 response options will be credited 6, 5, 4, 3, 2, or 1 from the most agreeable (Strongly Agree) to the least agreeable (Strongly Disagree). Since a high score on the ACPS indicates adaptability, those items in which a high response indicates a lack of adaptability were reverse scored and are identified on the factor table.

Culture analysis:

Three measures can be calculated from the ACPS instrument.

1. A total score on the instrument is the indicator of the level of adaptability of the whole culture as perceived by the respondents.
2. A sub score on those factors related to Boss indicate the level of adaptability of the Boss as perceived by the respondents.
3. A sub-score on those factors related to Team indicate the level of adaptability of the Team as perceived by the respondents.

ACPS Scoring and Factor Table

No.	Item	Factor
1	We avoid talking about difficult issues. **(REVERSE SCORED)**	Team
2	Our boss delegates authority to us.	Boss
3	We are encouraged to extract lessons from experiments – both successes and failures.	Boss
4	Recognition is based on team performance as well as individual performance.	Team
5	We tell one another the truth about what we see happening.	Team
6	We do our job and do not ask questions. **(REVERSE SCORED)**	Boss
7	Our boss openly discusses failures as well as successes with us.	Boss
8	We work well together in using our talents to advance the work.	Team
9	Our team climate encourages risk taking.	Boss
10	We are willing to challenge our boss's perspectives if we think it is important for the work.	Boss
11	Our boss is committed to our development as leaders.	Boss
12	Our boss rewards learning from our failures.	Boss
13	We work in our unit, but we don't feel we are responsible for its success. **(REVERSE SCORED)**	Team
14	In team meetings, we identify tough issues that need to be discussed.	Team
15	Our boss encourages us to watch for signs of him/her rushing to a quick fix to a problem.	Boss
16	We are encouraged to seize opportunities to take initiative.	Boss
17	Our boss encourages us to take time out of our workday for reflection and learning.	Boss
18	Departments share resources across boundaries for the common good of the work unit.	Team

No.	Item	Factor
19	In team meetings, we discuss the sensitive issues simmering under the surface.	Team
20	Worrying about our boss's expectations causes us to second guess our decisions. **(REVERSE SCORED)**	Boss
21	We are encouraged to exercise leadership beyond our job description.	Boss
22	We play a significant role in helping set the vision for the work unit.	Boss
23	In team meetings, we embrace the voices of dissenters.	Team
24	Our boss lets us know that he/she does not have all of the answers.	Boss
25	My boss has been very clear with me about my potential for growth within the unit and beyond.	Boss
26	Our boss asks deep questions about opportunities and issues facing our team' s long term success.	Boss
27	When problems arise, we own up to our share of the responsibility for the mess.	Team
28	If we sense there is an "elephant in the room," one or several group members develop a way to bring attention to it.	Team
29	Our boss encourages us to "do the right thing" rather than simply please him/her.	Boss
30	Our boss encourages us to have a professional development plan that is tailored to us individually.	Boss
31	At the end of a meeting, we take a few minutes to reflect on how the meeting went.	Team
32	We pitch in to help each other around deadlines and deliverables.	Team
33	In team meetings, we become curious about minority points of view and want to hear more.	Team
34	Our boss encourages independent thinking by giving work back to us.	Boss
35	We encourage each other to take leadership on the issues that matter most to us.	Team
36	After every project or initiative ends, the whole team meets to assess it and to clarify what we learned.	Team

No.	Item	Factor
37	We tend to think only about, and take responsibility for, our particular work unit. **(REVERSE SCORED)**	Team
38	When someone tries an experiment that doesn't work so well, our boss protects us with his/her superiors.	Boss
39	We are responsible for the risks we take as we exercise leadership to advance work we care about.	Boss
40	When any member of the team learns something important, that information and learning is systematically shared throughout the work unit.	Team
41	At our team meetings, we each express opinions on issues that fall outside of our individual scopes of responsibility.	Boss
42	Our boss seeks our advice.	Boss
43	We have a culture that is as open to discussing failures, as well as, it is to celebrating successes.	Boss
44	If you videotaped our team meetings, you would not know who the boss is.	Boss
45	Our boss readily acknowledges when he/she does not know the answer to a problem.	Boss
46	Our culture rewards time for reflection and learning.	Team
47	When someone takes a reasonable risk in the service of the mission and it doesn't work out, we use it as a learning opportunity - not an opportunity for criticism or punishment.	Boss
48	We are prepared to have honest conversations with our boss, even if we think he/she will disagree with us.	Boss

Appendix C

Dear [Principal Name],

My name is Michelle Wang and I'm currently a doctoral student at Bethel University. My research centers on adaptive culture within elementary schools and student achievement. I am contacting you regarding participation in my research collection by completing an online survey in which you and your building leadership team will be asked about your elementary school culture.

All survey responses are confidential. The survey will take approximately 15 minutes. Participation is voluntary and you, or building leadership team members, are free to withdraw from the study at any time with no impact on your relationship with Bethel University. If the results of this study were to be published, no identifying information will be used.

If you have any questions about this study, you may contact me (mfw38922@bethel.edu), or my advisor, Dr. Tracy Reimer (t-reimer@bethel.edu). This study has been reviewed and approved by the Bethel University Institutional Review Board (IRB).

If you agree to participate in the survey, please reply to this email with email contact information for your building leadership team members. Once your response is received, electronic survey links will be sent directly to you and each building leadership team member you have listed. Please reply with your intent to participate **no later than Friday, April 21, 2017**.

I am most appreciative of your willingness to participate.

Sincerely,

Michelle Wang
Bethel University Doctoral Student

Appendix D

Dear [Principal Name],

My name is Michelle Wang and I'm currently a doctoral student at Bethel University. My research centers on adaptive culture within elementary schools and student achievement. Recently you received an email from me regarding participation in my research.

I understand this time of year is a flurry of testing, completion of one year, and preparation for the next. I am hopeful that you and your building leadership team might consider participating in my data collection in order to better help elementary principals understand how leadership is practiced and culture is developed.

All survey responses are confidential. The survey will take approximately 15 minutes. Your participation is voluntary and you, or your building leadership team members, are free to withdraw from the study at any time without impacting your relationship with Bethel University. If the results of this study were to be published, no identifying information will be used.

If you have any questions about this study, you may contact me (mfw38922@bethel.edu), or my advisor, Dr. Tracy Reimer (t-reimer@bethel.edu). This study has been reviewed and approved by the Bethel University Institutional Review Board (IRB).

If you agree to participate in the survey, please reply to this email with email contact information for your building leadership team members. Once your response is received, electronic survey links will be sent directly to you and each building leadership team member. Please reply with your intent to participate **no later than Friday, April 28, 2017**.

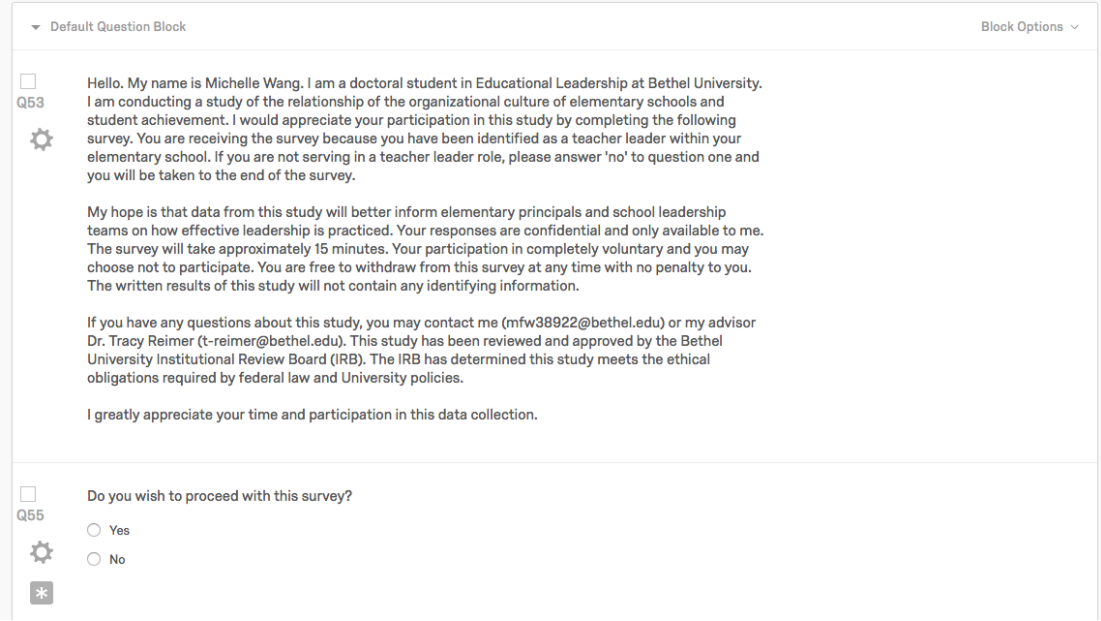
I am most appreciative of your willingness to participate.

Sincerely,

Michelle Wang
Bethel University Doctoral Student

Appendix E

Survey Consent:



Default Question Block — Block Options

Q53

Hello. My name is Michelle Wang. I am a doctoral student in Educational Leadership at Bethel University. I am conducting a study of the relationship of the organizational culture of elementary schools and student achievement. I would appreciate your participation in this study by completing the following survey. You are receiving the survey because you have been identified as a teacher leader within your elementary school. If you are not serving in a teacher leader role, please answer 'no' to question one and you will be taken to the end of the survey.

My hope is that data from this study will better inform elementary principals and school leadership teams on how effective leadership is practiced. Your responses are confidential and only available to me. The survey will take approximately 15 minutes. Your participation in completely voluntary and you may choose not to participate. You are free to withdraw from this survey at any time with no penalty to you. The written results of this study will not contain any identifying information.

If you have any questions about this study, you may contact me (mfw38922@bethel.edu) or my advisor Dr. Tracy Reimer (t-reimer@bethel.edu). This study has been reviewed and approved by the Bethel University Institutional Review Board (IRB). The IRB has determined this study meets the ethical obligations required by federal law and University policies.

I greatly appreciate your time and participation in this data collection.

Q55

Do you wish to proceed with this survey?

- Yes
- No

Appendix F

Michelle:

Sorry for the delay in responding to you. I have contacted my co-copyright holder, Dr. David Cox. He and I both agree that you may use our ACPS instrument, as long as it is used in total and you provide us access to your findings. If this is agreeable to you, I can provide you with a PDF version of the instrument.

Tammy Fowler

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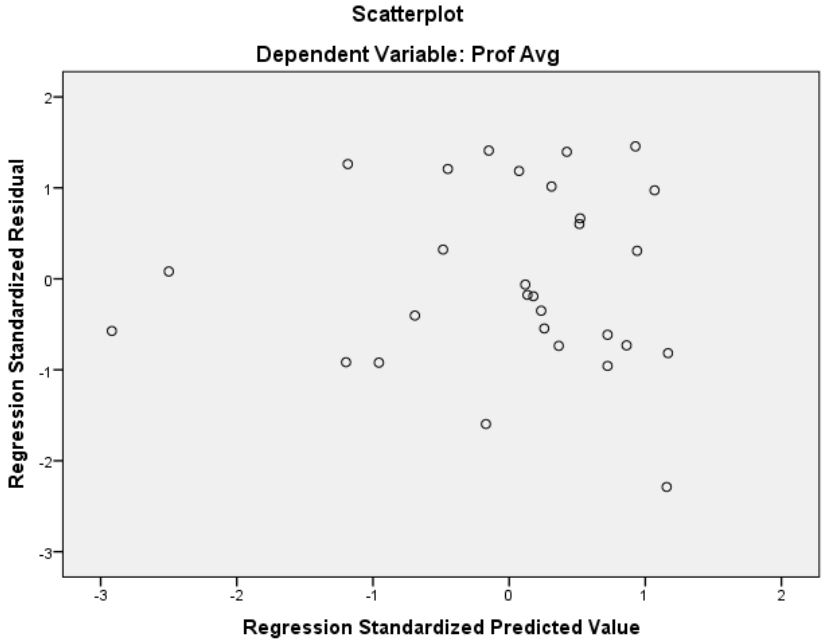
p. 870.680.8805
f. 870.680.8800

Appendix G


Scatterplot
Dependent Variable: Prof Avg
Regression Standardized Residual
Regression Standardized Predicted Value
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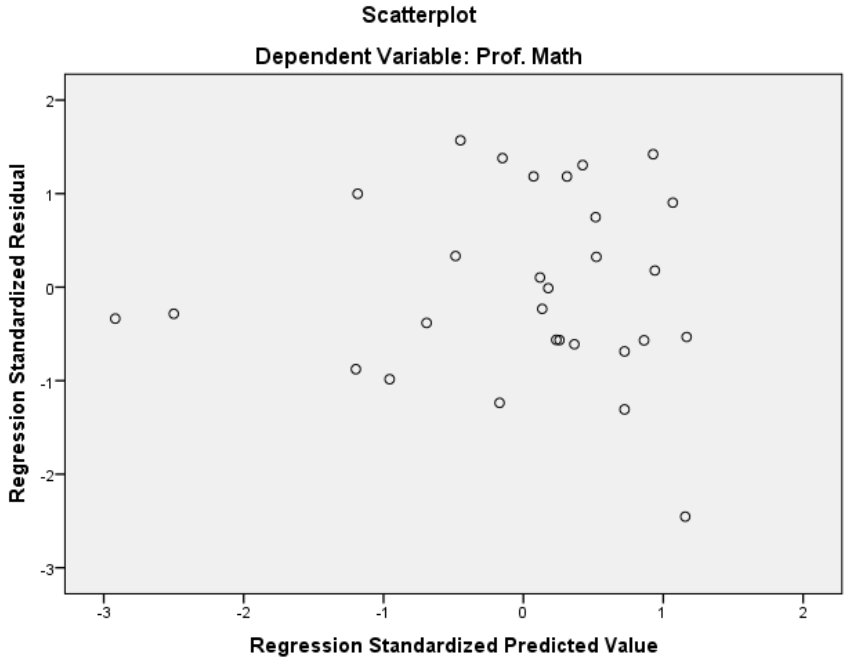
-1
-2
-3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Dependent Variable: Prof. Math
Regression Standardized Residual
Regression Standardized Predicted Value
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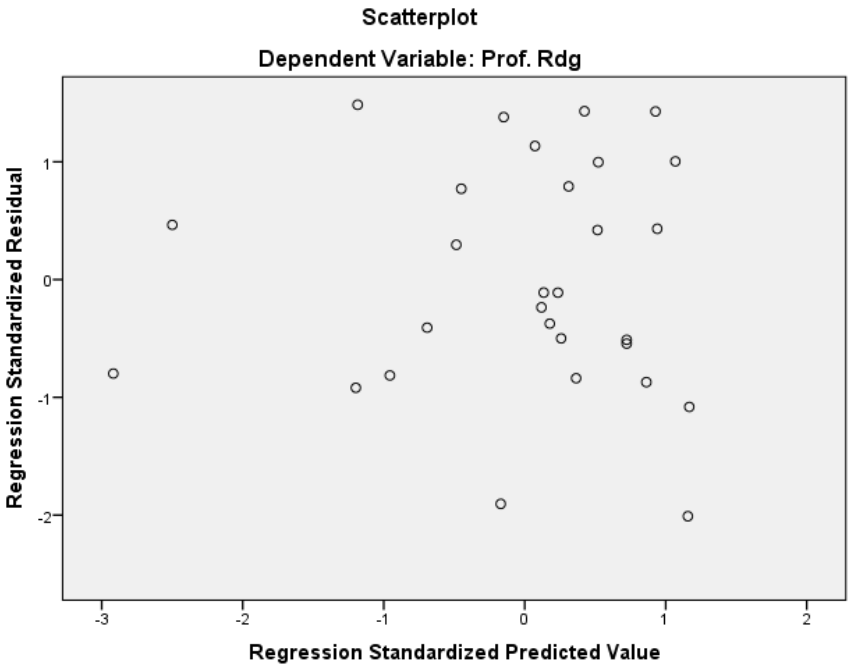
1
0
-1
-2
-3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Dependent Variable: Prof. Rdg
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Regression Standardized Predicted Value
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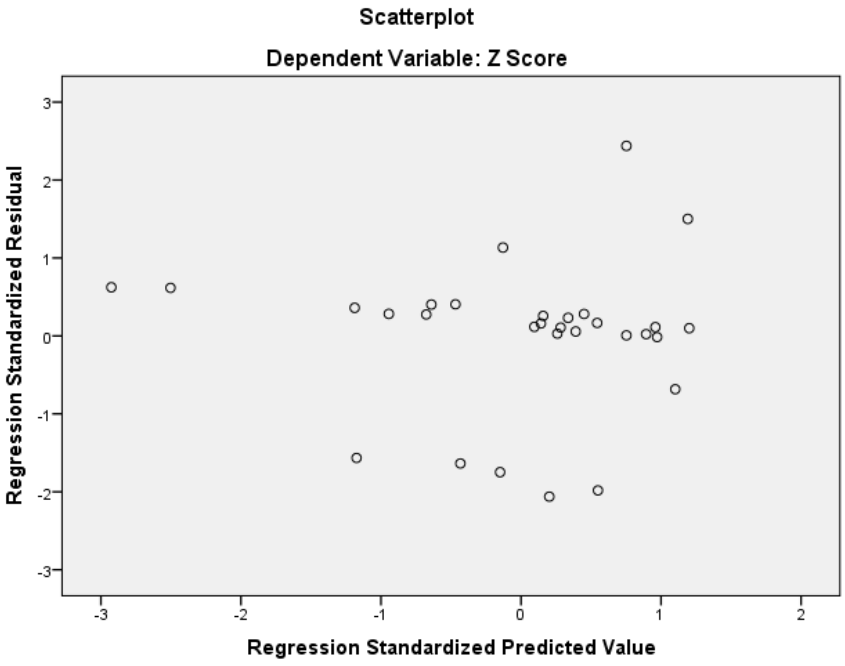
0
-1
-2
-3
-2
-1
0
1
2


Scatterplot
Dependent Variable: Z Score
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Regression Standardized Predicted Value
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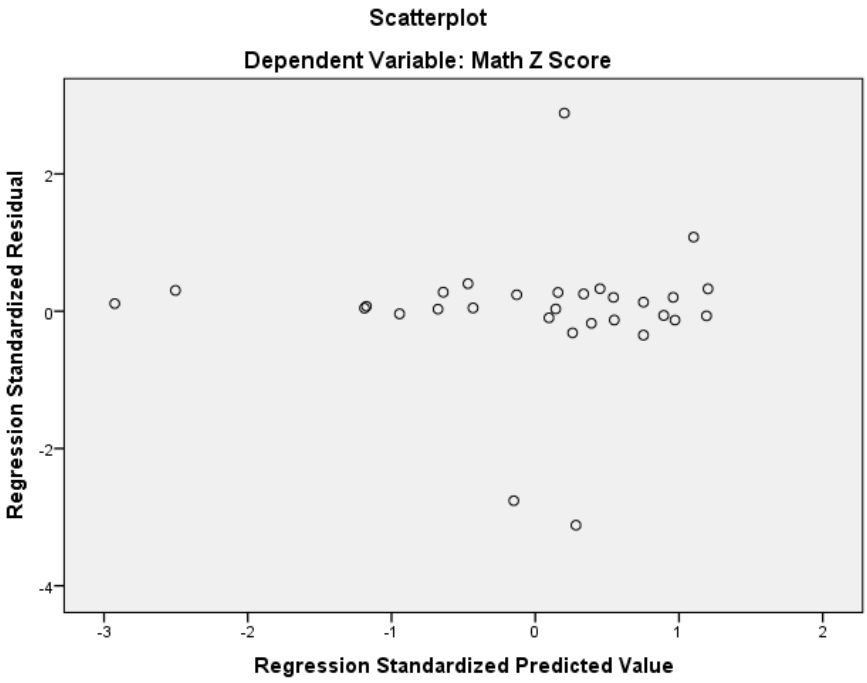
-3
-3
-2
-1
0
1
2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Dependent Variable: Math Z Score
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Regression Standardized Predicted Value
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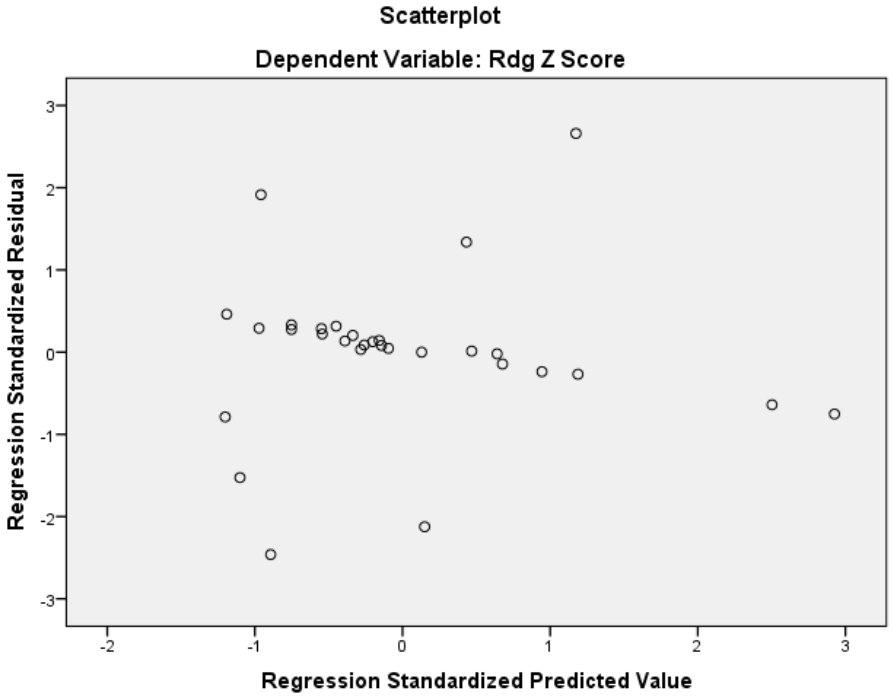
2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Dependent Variable: Rdg Z Score
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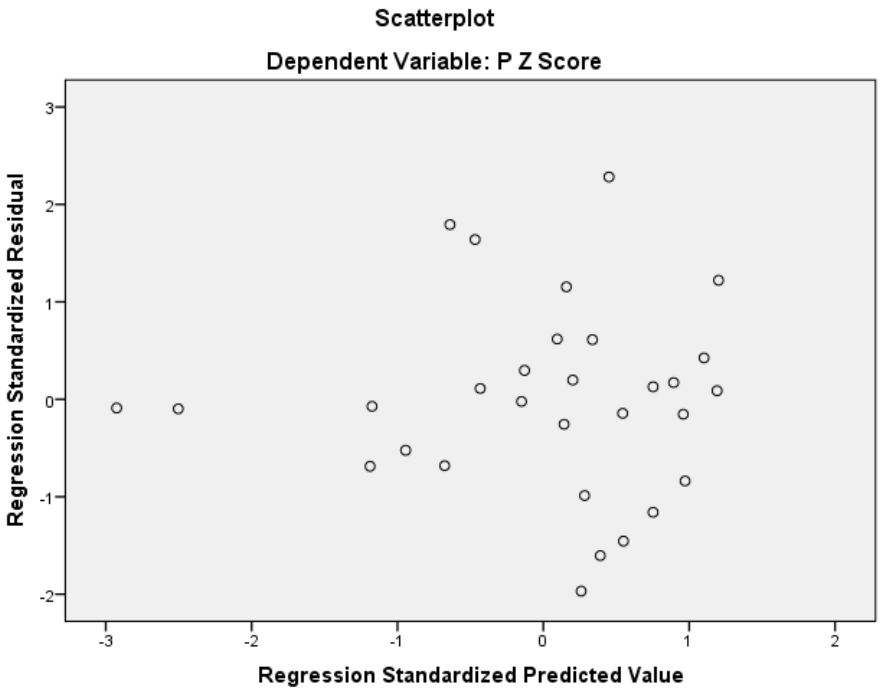
0
1
2
3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Regression Standardized Predicted Value
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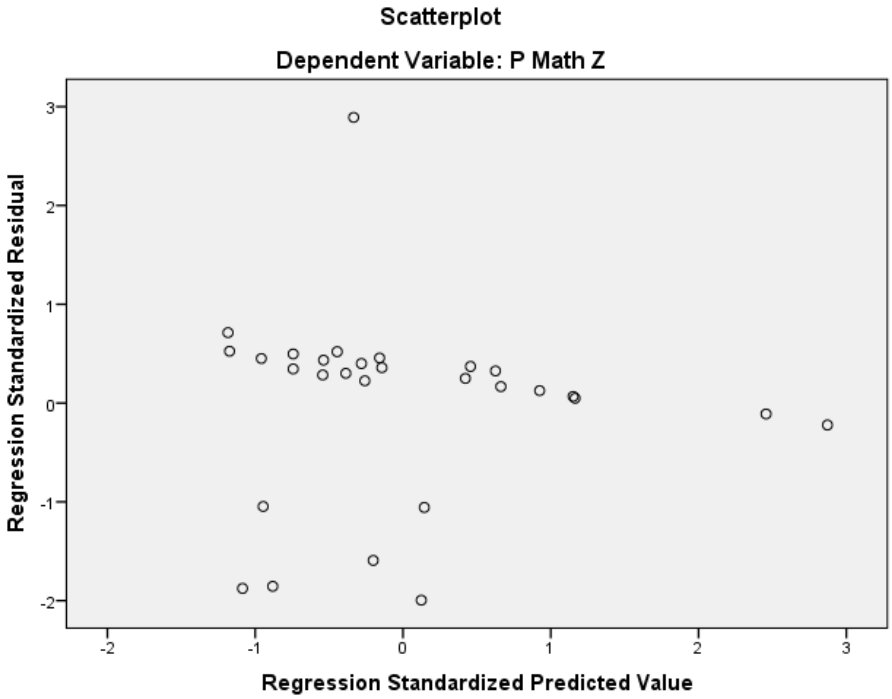
0
1
2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Dependent Variable: P Math Z
Regression Standardized Residual
Regression Standardized Predicted Value
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-2
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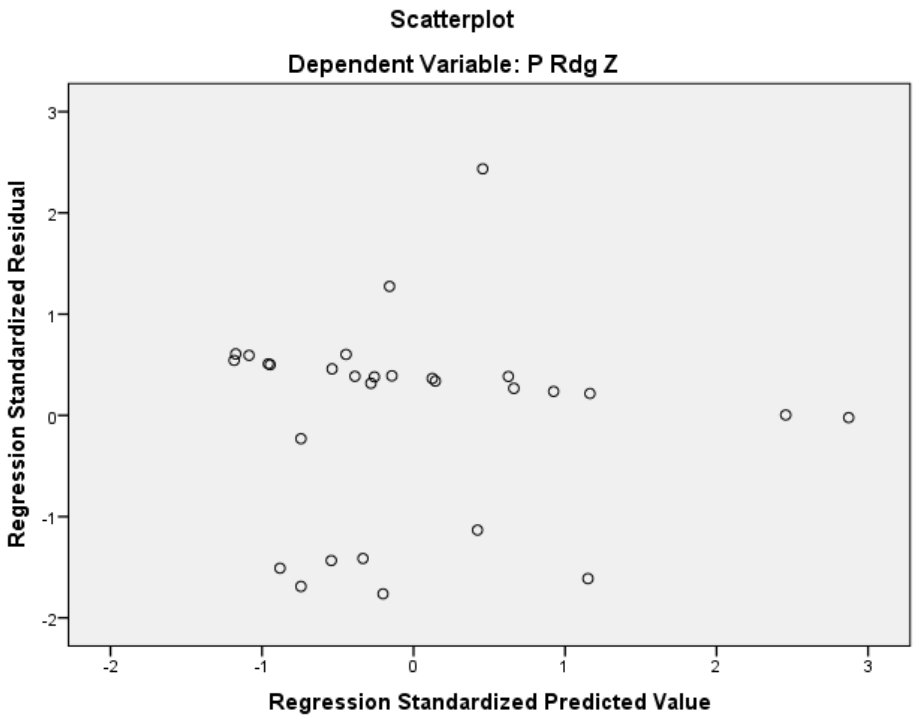
0
1
2
3


Scatterplot
Dependent Variable: P Rdg Z
Regression Standardized Residual
Regression Standardized Predicted Value
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0
-1
-2
-2
-1
0
1
2
3