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The Relationship Between Kindergarten to Grade 8 Principals' Epistemological Beliefs and School Success

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MPhil, Walden University, 2020

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Abstract

Although current research links teacher effectiveness and student success to epistemological beliefs, little is known about how those beliefs influence principal leadership and school success. The purpose of this study was to examine the extent to which epistemological beliefs of K-8 principals predict school success in a large U.S. metropolitan area (LMA). The theoretical framework was Perry's theory of epistemological development and Schommer-Aikin's theory of personal epistemology. In this quantitative correlational study, epistemological beliefs of K-8 principals were measured with the Schommer-Aikins Epistemological Belief Inventory and school success with School Quality Rating Policy (SQRP). Data were collected through a convenient sample from 51 K-8 principals with two or more years of experience in public and charter schools (out of a population of 105 in the LMA). Logistic regressions were conducted to determine if epistemological beliefs were a significant predictor of school success. Results indicated that the medium epistemological beliefs group was 8 times more likely to achieve school success than the low group. Individually, the four dimensions of epistemological beliefs were not predictive of school success. This research study increased our knowledge of the relationship between epistemological beliefs of K-8 principals and school success and has implications for principal leadership programs, principal selection processes, and school success. School success can translate into student success in elementary, high school, college, and vocational school and can have spillover effects on urban renewal.

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Dedication

I would like to dedicate this dissertation to my wife, Estelle “Penny” Sanford, who provides all of the following: love, patience, support, and counsel. In addition, I dedicate this dissertation to all of my family and friends who provided support.

Acknowledgments

I would like to acknowledge Dr. John A. Harrison for his steadfast guidance throughout my journey. I would also like to acknowledge Dr. Joshua Bass for his assistance, advice, and concern. Finally, I would like to acknowledge the Walden community for all of the assistance that I received throughout my journey.

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Chapter 1: Introduction to the Study

In this quantitative correlational research study, I examined the relationship between the epistemological beliefs of kindergarten to Grade 8 (K-8) elementary school principals and how those beliefs predicted school success. The specific focus of this dissertation was on how epistemological beliefs of K-8 principals predict school success within a large metropolitan area (LMA). Herring (2018) concluded that it is important for principals to be aware of factors that influence how they use data within schools to make decisions. However, there is very little current research (Schraw (2017) on the relationship between K-8 principal's epistemological beliefs and school success. Epistemological beliefs, according to Schraw (2017), are beliefs and cognitions about the nature of knowledge and knowing held by individuals. In the context of this studydissertation, epistemological beliefs are beliefs and cognitions about the nature of knowledge held by principals, in particular, how they consider their leadership.

This study needed to be conducted because better understanding the relationship between the epistemological beliefs of principals and school success may provide insight that educational leaders can use to create more effective schools. Increased school success may yield positive social change for all those associated with the school system, as well as the neighborhoods in which the schools exist. School success was the outcome variable and was measured using the School Quality Rating Policy score (CITE), which is further detailed in Chapters 2 and 3. Successful schools, especially in high-poverty areas, have the potential to transform the neighborhoods in which they exist. In many cases, a good school is the single most important variable that can bring increased

business development to the community (Mendez & Gayo, 2019). Thus, understanding the predictive value of epistemological beliefs for school success may lead to positive social change by having a positive systemic effect on neighborhoods and communities.

In this chapter, I provide an overview of the study that I conducted. This chapter consists of the background of the study, followed by the problem statement and the purpose of the study. After stating the research question (RQ) and hypotheses, I describe the theoretical foundation and nature of the study. The definitions of terms used in the study follow. This chapter also contains the assumptions, scope and delimitations, limitations, and significance of the study and a summary section.

Background

Since the landmark No Child Left Behind Act (NCLB) of 2001, K-12 schools and school district in the United States have been required to make annual yearly progress (AYP) benchmarks. The U.S. Department of Education established the AYP guideline to measure the performance of schools in reading and math (Jones et al,2018). Schools that make AYP goals have to meet federal and state standards in both math and reading (Jones et al., 2018). AYP is measured at the end of each school year. As a measure of school performance, AYP is based on several categories, including student performance in math, a high-stakes reading achievement test, attendance rates of students, and graduation rates of schools. the principal, as the educational leader of the school, has the overall responsibility of meeting the requirements of each one of these performance categories each year (Friedman, 2020; Liethwood et al., 2020; Travlos, 2020).

Under federal guidelines established under the NCLB (2001), schools that fail to meet AYP for 2 consecutive years face sanctions by both federal and state governments (Jorgensen & Hoffman, 2003). However, how schools are sanctioned is left largely up to the states. In general, the authorities of many states have set up stages of sanctions for schools that do not make AYP for 2 years or more. In the LMA district that was examined in this study, schools that failed to make AYP moved through stages that involved warnings to complete restructuring. Schools that continually failed to meet state AYP standards each year were closed, and students were forced to find alternative schools, in many cases, outside of their neighborhood. NCLB legislation spurred the creation of charter schools in many cities, which offer an alternative to failing schools by providing parents with school choice (Breger, 2017). The increase in charter schools in many urban U.S. school districts has caused enrollment in local public schools to dwindle, resulting in underutilized public-school buildings (Breger, 2017). Along with poor academic performance, underutilized buildings have provided a rationale to close schools .

Federal lawmakers significantly revised how AYP is measured under the guidelines of the Every Student Succeeds Act (ESSA) of 2015 (see also Illinois ESSA Plan Executive Summary, 2018). Under the Obama administration, lawmakers passed the ESSA to replace NCLB. This change gave more authority back to the states to guide school success. Thus, states have more control over high-stakes testing as well as school closures (Hales et al., 2018). What progress is considered adequate is now determined by the states and not the U.S. Department of Education. This requires engaging at the local

level to determine school quality an progress for low-performing schools (Illinois ESSA Plan Executive Summary, 2018). AYP remains a significant indicator of effective principal leadership (Buske & Zlatkin-Troitschanskaia, 2019; González-Cauley, 2018; Haim Shaked, 2020; Yan, 2020). Breger (2017) found that 57 out of 455 public schools in the LMA met AYP standards in 2013. Schools that do not meet AYP standards are consistered failing and are at risk of being restructured or closed. Out of all stakeholders (e.g., teachers, counselors, and other personnel), the principal is "the mandated person responsible for student success" (Breger, 2017, p. 311). Their decisions could determine the continued existence of the schools they lead.

Annual Yearly Progress and School Rating Quality Policy

Under ESSA (2015), AYP is still a measure of school performance based on several categories: student performance in math, reading achievement tests (a high-stakes test), attendance rates of students, and graduation rates of schools. Meeting the requirements of each one of these performance categories is still the overall responsibility of the principal, as the educational leader of the school. Thus, whether a school meets annual AYP is the responsibility of the principal. At the end of each year, each school in the LMA receives a school quality rating, called the School Quality Rating Policy (SQRP). These ratings are based on the school's AYP performance. So, if a school's AYP is low, its SQRP will also be lower.

School leadership is associated with performance standards on standardized tests (Leithwood et al., 2020). Moore et al. (2016) found that teachers' perceptions of principals as instructional leaders were connected to academic achievement on

standardized tests. Instructional leadership is critical to perceived school success. Buske et al. (2019) found that epistemological beliefs of principals have some influence on data usage within schools. If, for example, a principal is skeptical towards internal data generated within a school, then important data generated within the school may not be used in day-to-day decisions.

On the other hand, the same skepticism could also be found with external data. Decisions to use or not use certain kinds of data can have a significant impact on the success of a school (Buske & Zlatkin-Troitschanskaia, 2019). Seminal epistemological studies have shown that many of these kinds of decisions are made at the preobservational level (Duell & Schommer-Aikins, 2001; Schommer-Aikins, 2010; Schraw et al., 2002). Thus, epistemological beliefs are often unstated and go unrecognized by the decision maker. The effective use of data is a critical factor in school success. Buske and Zlatkin-Troitschanskaia (2019) stated: "The more developed the epistemological beliefs are, the more it will be possible to support knowledge sharing and data use in schools, leading back to the position of the principal" (p. 127). Epistemological beliefs includes beliefs about the source of knowledge and whether it is internal or external (Duell et al., 2001; Schommer-Aikins, 2004; Schommer-Aikins, 2010; Schraw et al., 2002). Numerous studies have shown the impact that epistemological beliefs have on teachers and elementary, high school, and college students (Schraw et al., 2017). In reviewing the literature, I found no current quantitative studies that illuminate the relationship between epistemological beliefs of principals and school success. Buske and Zlatkin-Troitschanskaia (2019) found that principals who hold

specific epistemological beliefs towards a source of knowledge have a tendency to either use external sources of knowledge (i.e., scientific journals or internal knowledge generated from within the school) to make decisions. How epistemological beliefs influence principals to make decisions is considered an underresearched area, according to Buske and Zlatkin-Troitschanskaia.

This study was needed for three reasons. First, school leadership is associated with performance standards on standardized tests (Sun et al., 2016). Second, epistemological beliefs of principals are critical to understand because such beliefs influence decision making, problem-solving, knowledge sharing practices, efficacy, and instructional approaches to the curriculum, which in turn affect student academic performance (Spiess, 2017). Third, there is a gap in the literature on the relationship between the epistemological beliefs of K-8 principals and school success. Therefore, this study was appropriate and may contribute to addressing the gap in in the literature.

Problem Statement

It is not known if, or to what extent, the epistemological beliefs of K-8 principals are predictive of school success. Buske and Zlatkin-Troitschanskaia (2019) identified epistemological beliefs of principals and how they influenced data use within schools as an important area of research that needs more attention. Herring (2018) found that it is important for principals to understand their own data dissemination practices. Principals play a determinative and decisive role in school reform (Herring, 2018; Schechter et al., 2017). They are mandated with translating policy into action within the school (Schechter & Shaked, 2017). This makes the role of the principal within the school very important.

Therefore, any research that can help to illuminate and improve upon their capacity is worthy of attention. Furthermore, the current federal administration's emphasis on vouchers and parental choice with more decentralization will create a more competitive environment for public schools as well as charter schools. Thus, school survival will depend more and more on effective decisions of principals. The problem that was addressed in this study is that there is no current quantitative research, based on my review of the litarture, on the personal epistemological beliefs of principals and school success.

There are several seminal studies on epistemological beliefs and principal leadership. Arredondo and Rucinski (1998) were some of the first researchers to raise the question of how certain epistemological beliefs of principals affect the adoption of certain innovations within schools, hiring of teachers, participation of teachers, in school-wide decisions, and decisions about which curriculum to adopt. Arredondo and Rucinski concluded that there is no significant difference between teacher epistemic beliefs and those of principals. Arredondo and Rucinski also argued that the administrator's personal epistemological beliefs influenced curriculum decisions as well as the adoption of specific innovations within the school. Tam (2018) and Varaki (2003) concluded that personal epistemological beliefs of administrators are tied to leadership style and therefore ought to be considered as a factor when hiring principals. Finally, Brownlee et al. (2009, 2010) found a relationship between epistemological beliefs of childcare leaders in Australia to leadership styles. However, these studies on epistemological beliefs of school leaders are somewhat dated.

Furthermore, the authors of these studies found that there was either a connection between epistemological beliefs and transformational leadership and/or curriculum decisions. Thus, in this study I investigated the epistemological beliefs of K-8 principals and whether certain epistemological beliefs of principals predict the success of the school. I attempted to address the gap of knowledge on how epistemological beliefs of principals predict school success.

Purpose of the Study

The purpose of this quantitative correlational study was to examine to what extent epistemological beliefs of K-8 principals in the target LMA predicted school success. The first variable was the independent predictor variable epistemological beliefs, as measured by the Schommer-Aikins (2004) Epistemological Belief Inventory. The second variable was the dichotomous dependent variable, school success, as measured by the four domains of the SQRP. All the questions on the SQRP are rated on a 1-5 scale. School success is scored 0 (unsuccessful) or 1 (successful). The original categorical scoring system of the SQRP is 1 for highest performance (this is a nationally competitive school), 2 for high performance (this is a good school choice with many positive qualities), 3 for somewhat low performance (additional support from the network team is needed), 4 for below average performance (provisional support status requires increased support from the network), and 5 for lowest performance (the school is in need of intensive intervention. In the SQRP scale, 1 and 2 equal pass (1), and 3, 4, and 5 equal fail (0).

Research Question and Hypotheses

The RQ and hypotheses for the study were as follows:

RQ: To what extent do epistemological beliefs of K-8 principals predict school success?

$H_0$1: Epistemological beliefs of K-8 principals, as measured by the Schommer-Aikins Epistemological Belief Inventory, are not significant predictors of SQRP school ratings.

$H_1$1: Epistemological beliefs of K-8 principals, as measured by the Schommer-Aikins Epistemological Belief Inventory are significant predictors of SQRP school ratings.

$H_0$2: Epistemological beliefs of K-8 principals, as measured by the four individual sub-scales of the Schommer-Aikins Epistemological Belief Inventory and the number of years as principal are not significant predictors of SQRP school ratings.

$H_1$2: Epistemological beliefs of K-8 principals, as measured by the four individual sub-scales of the Schommer-Aikins Epistemological Belief Inventory and the number of years as principal are significant predictors of SQRP school ratings.

Theoretical Foundation

The theoretical framework for this study was Perry's (1999) seminal theory of epistemological development, as well as Hofer's (2002) and Schommer-Aikin's (2004) theories of personal epistemology. Perry theorized epistemological development based on his studies of the cognitive and ethical development of undergraduate students. He contended that college students go through four stages of mental and moral development. The four stages are dualism, multiplicity, relativism, and, lastly, commitment.

In the Perry (1999) framework, dualism is the belief that every problem is solvable, that students are to learn the right answers, and that one must obey authorities. Multiplicity is based on two types of problems: solvable and unsolvable. In this stage, students put trust in their own inner voice. During the third stage, relativism, all solutions to problems must have reasons and must be viewed within a specific context. Every issue must be evaluated because everything is contextual. Lastly, commitment involves an acceptance of uncertainty as part of life. During this stage, students use the combination of personal experience and evidence learned from outside sources to arrive at conclusions.

Schommer-Aikins (2004) introduced a quantitative measurement of epistemological beliefs and several new ideas within the field. A central idea is that epistemological development is asynchronous and that epistemological beliefs are distinct ideas. Schommer-Aikins conducted over 15 empirical studies on epistemological beliefs on college and high school students. In 1991, Schommer-Aikins proposed a quantitative model of assessing epistemological beliefs that was based on five features of an epistemological belief system that distinguished it from previous models. The first of the five features is the source of knowledge. The second is the certainty of knowledge. The third is how knowledge is organized. The fourth feature is how learning is controlled. Finally, the fifth feature is the speed of learning.

A premise of Perry's (1999) theoretical framework is that epistemological beliefs are not unidimensional. Epistemological beliefs develop over time, and development in one stage may affect other stages.In LMA school success is measured through the SQRP.

The SQRP has a 1-5 scale, where 1 and 2 equal pass, and 3, 4, and 5 equal fail (0). School success is scored 0 (fail) or 1 (pass). The four dimensions of epistemological beliefs are scored on a 1 to 5 scale. This was because Schommer-Aikins's (2004) theoretical framework argues that epistemological beliefs are deeply ingrained beliefs within the psyche that affect decisions and behavior. The SQRP rating is a result of how principals make decisions within the school. Therefore, SQRP ratings are affected by the epistemological beliefs of the principal. There are four subscales of Schommer-Aikins's (2004) Epistemological Beliefs Inventory. Therefore, each subscale was included independently in the logistic regression model.

Additionally, Perry's (1999) and Schommer-Aikins's (2004) theoretical frameworks were aligned with the quantitative research approach. Both of these instruments are validated, and their reliabilities have been tested. Second, Schommer-Aikins stated that epistemology should be measured quantitatively. So, given that the two theoretical frameworks help explain the outcome of the study's RQ, and their research designs are aligned with the research design of the current study, Perry and Schommer-Aikins were deemed appropriate for this study.

Nature of the Study

I used a quantitative methodology featuring a regression correlational design. Researchers conducting regression correlation studies evaluate if there is a linear predictive relationship between two or more variables (Cresswell, 2018; Fields, 2018). Even though one of the study variables was dichotomous, a linear relationship was

possible (see Field, 2017; Pallant, 2020). The dependent variable is dichotomous and the predictor variable is continuous, thereefor,logistic regression was used. .

The data for this investigation came from two sources. The first source was archival data of public records of schools' yearly SQRP rating from K-8 elementary schools selected from an LMA comprising 111 schools. The second set of data was sourced from the Epistemological Belief Inventory (Schommer-Aikins, 2004). I administered principals from the selected schools the Schommer-Aikins Epistemological Belief Inventory. The sample size for this project was 111 schools and was partly informed by the statistical technique used to analyze the data. The data from school-reported SQRP status had five categorical levels, which ranged from highest performance (1) to lowest performance (5). If a school is Level 1 or 2, it is considered as a success. If it is Level 3 (somewhat low performance) to 5 (lowest performance), the school may receive provisional support or intensive support from the network in which it is placed. Therefore, 1 and 2 equal pass (1), and 3, 4, and 5 equal fail (0). So, school success is scored 0 (fail) or 1 (pass).

The Schommer-Aikins Epistemological Belief Inventory consists of a 5-point Likert scale. Such data are considered interval data (see Connally, 2007). School success was scored 0 (fail) or 1 (pass). According to Field (2018) and Pallant (2020), a binomial logistic regression is used when one or more continuous and/or categorical variables are used to predict a binary outcome variable. I chose the binary logistic regression model because of the level of measurement associated with the coefficient type.

Definitions

Adequate yearly progress (*AYP*): A yearly performance measure of state and local K-12 schools that, in Illinois, is linked to a LMA school's yearly SQRP rating (Illinois State Board of Education State Template for the Consolidated State Plan Under Every Student Succeeds Act, 2017).

Certain knowledge: The belief that knowledge is absolute (Schommer-Aikins, 1989).

Dualism: A perspective that knowledge is a binary right or wrong centered on authority (Perry, 1999). Thus, whether knowledge is right or wrong is determined by some authority (Perry, 1999).

Epistemological beliefs: Beliefs about the nature of knowledge and learning (Duell & Schommer-Aikins, 2001)

Every Student Succeeds Act of 2015 (*ESSA*): The reauthorization of NCLB. The legislation shifted to states accountability for quality education within public schools (ESSA, 2015). State authorities determine accountability for school success.

Innate ability: The belief that what one learns does not exceed one's inborn ability (Schommer-Aikins, 1989).

No Child Left Behind Act of 2001 (*NCLB*): A law passed by the Bush administration in 2001 to reform public education. It mandated that all schoolchildren read and do math at grade level by 2014 or face sanctions by the federal government, such as the elimination of Title I funds to schools and school districts which consistently fail to meet AYP (Education Law Center, 2010).

Omniscient knowledge: Knowledge that is given by those in authority (Schommer-Aikins, 2004).

Quick learning: The belief that learning is not linked to repetitive practice (Schommer-Aikins, 2004).

School Quality Rating Policy (*SQRP*) *rating*: –The performance rating of elementary and high schools in the target LMA. Schools are rated as Level 1, 2 or 3 (Chicago Public Schools, 2017). Furthermore, each level is further subdivided into two levels. Thus, Level 1 has two levels and so forth. Level 1 is the highest performance rating, and Level 3 is the lowest (Chicago Public Schools, 2017).*Simple knowledge*: The belief that knowledge is characterized by facts (Schommer-Aikins, 2004).

Assumptions

There were four general assumptions of this study. First, I assumed that all adults have beliefs about the nature of knowledge and learning even if they are unaware of them (see Schraw et al., 2017). Second, I assumed that principals have a major impact on the school meeting local school success standards. A third assumption was that K-8 principals would be honest and forthcoming with their responses on the Schommer-Aikins Epistemological Belief Inventory. Finally, I assumed that the Schommer-Aikins Epistemological Belief Inventory would accurately measure the epistemological beliefs of principals in an LMA.

Scope and Delimitations

In this research study, I focused on the epistemological beliefs of K-8 principals in an LMA area. My specific focus was on LMA elementary school principals. I asked

participating principals who had served at an elementary school for 2 or more years to take the Schommer–Aikins Epistemological Belief Inventory. The delimitations of the study included the sample size of 51 principals. This study sample was a convenience sample and was contained to an LMA school system. Any conclusion about the relationship to epistemological beliefs and SQRP is confined to the target LMA school system. There may be implications from the findings of this study that can be applied to similar urban school districts with similar characteristics to an LMA school system. For example, this LMA was located in the United States and has a diverse ethnic group population. So, the results of this study may potentially be generalized to a similar urban school district in the United States.

Limitations

There are several possible limitations of this study related to sample and methodology. First, although I included all 111 schools in the LMA in the sampling frame, I used a convenience sampling approach to select principal participants. This means that the final sample may not be representative of the total population. Therefore, the convenience sample may limit the projectability of results. Also, because the total population size is only 111, there is a possibility that the response rate may be low enough to adversely affect statistical power, which would lower my ability to detect statistically significant results if they actually existed in the real world (Fields,2018).

Significance

NCLB (2001) called for all children in the United States to be able to read and do math at grade level by 2014. All schools had to make AYP toward those goals or face

sanctions from the U.S. Department of Education. One of the driving forces behind the sanctions was the idea that the nation's security was imperiled by the failure of the educational system to produce citizens who could compete globally (Friedman,2020). Since the enactment of the 2001 NCLB legislation, AYP has been established as the national measure of success for elementary and high schools (Friedman,2020). However, with the enactment of ESSA (2015) legislation, the formula and content of the AYP mandate was left up to the states to determine. As such, principals are the main driving force behind school success. In the target LMA, due to poor academic performance and/or underutilization, over 50 schools have been closed as of 2015. Many of the schools that were closed had failed to meet AYP for more than 3 years. The consequences of not meeting AYP have made principal leadership a major concern. Breger (2017) found that few schools in a LMAwere meeting AYP standards.

The principal is the educational leader of a school. Personal epistemological beliefs of principals are important because they are the matrix out of which decisions are enacted within the school (Green,2018). The cumulative decisions and actions made by the principal affect the meeting of annual goals (Green,2018). Therefore, improving school performance may be impacted by understanding the personal epistemological beliefs about leadership of K-8 principals. Green (2018) found that principal-driven school improvement affects community development within neighborhoods where a school is located. Improving school performance by increasing knowledge of the role that leadership epistemological beliefs play in school success could have the social impact of economic reinvestment in troubled communities across the United States.

Summary

The landmark 2001 NCLB legislation mandated that all students in a U.S. elementary to secondary school both read and do math at grade level by 2014 (Flores, 2017). Although the Obama administration sought changes in the reauthorization act, ESSA, the fundamental 2001 NCLB framework remains in place. Schools that fail to make AYP for 2 or more years are required to undergo a school improvement process, which many states have adopted (Friedman,2020). AYP was the national performance measure for schools. However, new performance measures and AYP standards under the ESSA (2015) legislation are under the purview of states. In the target LMA, schools are evaluated based on SQRP rating. Principals remain the main driving force behind school success. The ultimate end of the reform process is either an improved school or a school that has been restructured or closed. In many urban school districts, such as LMA schools, school closings for academic performance or underutilization can be traced back to the 2001 NCLB legislation (Friedman,2020). SQRP formula is a tier-based formula. When schools are rated as Level 2 below the 50th percentile and require provisional or intensive support for 2 or more years, parents have the choice to send their students to schools with higher SQRP ratings. This results in a draining of the school's resources (Steinberg et al., 2017). As students leave, budgets shrink, teachers may be laid off, and the school ma close.

Thus, in the post-NCLB 2015 era, schools are closed through attrition versus the top-down closings that were typical of the 2001 NCLB period. Vouchers and parental choice for school, rather than federal intervention, underpin changes to schools.

Leadership therefore is an important variable to examine. Leadership is a critical factor and predictor of school success (Schechter & Shaked, 2017). Buske and Zlatkin-Troitschanskaia (2019) found that epistemological beliefs have a limited impact on how principals use data within their schools to achieve success. Thus, understanding the relationship of K-8 personal epistemological beliefs and the yearly SQRP rating can have a significant impact on school improvement and the implementation of ESSA (2015) state guidelines.

Chapter 2 includes a literature review that is relevant to the purpose of this study. I examine the epistemological theories of Perry (1999), Hofer (2001), and Schommer-Aikins (1994). In addition, I review current and relevant literature on how the epistemological beliefs of principals influence leadership decisions and the achievement of Level 1 or 2 status. The relevant literature includes several studies that are seminal to the goals of this study. These studies by Arredondo and Rucinski (1998) and Varaki (2004), and Seales (2011) address the relationship between epistemological beliefs and principal leadership.

Chapter 2: Literature Review

Introduction

In this quantitative correlational study, I examined whether there was a relationship between epistemological beliefs of K-8 principals in LMUSD and school success as measured by the School Quality Rating Policy (SQRP) rating. A better understanding of this relationship could help educational leaders to improve student achievement, principal selection, and overall school improvement. Epistemological beliefs are linked to student achievement from elementary school through high school (Schraw et al., 2017). Student achievement, specifically in elementary school, is also affected by principal leadership (Buske & Zlatkin-Troitschanskaia, 2019). Buske and Zlatkin-Troitschanskaia (2019) and Herring (2018) both concluded that more research needs to be done to illuminate the impact of principal beliefs on how data is used within schools to achieve success. I conducted this study to address this gap in the literature.

Chapter 2 of this study contains a review of the epistemological theories from three major seminal researchers in the field of personal epistemology: Perry (1999), Hofer (1997, 2002) and Schommer-Aikins (1994). Perry (1999) pioneered the study of epistemological beliefs and was the first researcher to associate epistemological beliefs to student achievement. Both Hofer (1997, 2002) and Schommer-Aikins (2004) connected epistemological beliefs to student achievement at the primary and secondary levels. Thus, all three researchers were relevant to this investigation. Also, this chapter includes a review of seminal studies that directly relate to the purpose of this study. In the literature review, I also examine the current literature on personal epistemology, the achievement

of AYP through principal leadership, and NCLB and AYP requirements under the new ESSA (2015) guidelines. In the chapter, I also review the literature search strategy.

Literature Search Strategy

I used the databases Education Source and Academic Search Complete to search for relevant data. The search terms *epistemological belief*, *achievement*, *leadership*, *learning*, *metacognition*, *methodology*, *self-regulation*, and *teaching* were used to find relevant research. I examined the relationship of epistemological belief in the achievement of AYP. Between the years 2017 to 2021, there were 31 search results for epistemological beliefs and achievement, leadership learning, and teaching. When I used related search terms, such as *epistemic beliefs*, *personal epistemology*, and *beliefs about knowledge*, I found that the resulting literature generally was from the same cluster of researchers.The same researchers seem to dominate the research within this area. Furthermore, the research did not focus on epistemological beliefs of principal leadership.

The search covered the period from January 2017 to November 2021. The goal was to find current peer-reviewed research on epistemological beliefs and leadership and principal or administrative leadership. When combining the terms *epistemological beliefs* and *principal* and *administrator*, I found few studies that were published within the past 5 years. There is a plethora of research on the relationship between epistemological beliefs and teaching practices and other topics (Schraw,2017).; however, I found none on the relationship between epistemological beliefs and a principal's leadership. I used ProQuest Academic Completeand Emerald Management databases to search for literature. The

ProQuest search of epistemological beliefs and leadership yielded 1,168 results for 2016 through 2021. These results yielded research on epistemological beliefs connected to domain research, teaching, and students. In searching the Emerald management database, I used the search descriptors *principal's use of data* and *data-driven leadership.* The results yielded over 4,000 articles. However, only two were relevant to this study.

The focus of this study was on determining whether epistemological beliefs of K-12 principals predict school success. Thus, I excluded studies that did not address this connection. I used the search phrase *principal's beliefs affect school performance* to examine current research on how principal beliefs impact teacher performance and school success. This yielded research that was indirectly related to this study. These studies focused on self-efficacy, perceptions about curriculum, and beliefs about leadership style. This research showed that beliefs that principals hold impact both teacher performance and school-wide success. This provided ancillary support to the focus of this study, which was the impact that epistemological beliefs of principals, as measured by Schommer-Aikins Epistemological Belief Inventory, have on leadership that leads to school success.

Theoretical Foundation

Personal epistemology is a cross-discipline study of an individual's beliefs about the nature of knowledge and the process of knowing (Hofer & Pintrich, 2002). As such, it is considered a psychological construct (Hofer, 2010). Perry (1968, 1999), Hofer (2010), and Schommer-Aikins (2004) applied personal epistemology to the study of academic achievement at all levels of school. Although the study of epistemological beliefs began with Perry's (1999) seminal study of college freshmen, scholars in the field currently

investigate individual epistemological beliefs of children and adults (Perry,1999).. Personal epistemology relates to the present study because I examined the epistemological beliefs of principal's leaders at the K-8 level as they contribute to school progress. I chose the K-8 educational level for examination because student success in elementary school is a predictor of high success (Schommer-Aikins,2004). Table 1 displays the research interest and focus of several scholars within the field.

Table 1

Epistemological Models and Units of Analysis

Epistemological model	Unit of analysis
Baxter Magolda (2004)	College and adults
King and Kitchener (1994)	Elementary through graduate school
Perry (1968,1999)	College students
Schommer-Aikins (2004)	Middle, high school, and college

There are many terms used to describe individual beliefs about knowledge. These include

- epistemological or epistemic beliefs (Hofer & Pintrich, 1997; Schommer-Aikins, 1994)
- reflective judgment (King & Kitchener, 2004).
- ways of knowing (Schommer-Aikins & Easter, 2009)
- epistemological reflection (King & Kitchener, 2004)
- personal epistemology (Hofer, 1997).

The dominant terms within the literature are personal epistemology and epistemological beliefs (Schommer-Aikins,1990, 2004). In addition, several definitions within the

scholarly literature describe an individual's beliefs about knowledge and the knowing process. Table 2 includes definitions for the various epistemological terms.

Table 2

Definitions of Epistemological Terms

Term	Definition	Source
Epistemological or Epistemic belief	Individuals' conception of knowledge and knowing. Individuals' belief about the nature of knowledge and knowing process. An individual's beliefs about knowledge and the knowing process.	Brownlee et al. (2008)), Hofer & Pintrich (1997) Schommer-Aikins (1994),
Reflective Judgment	The way individuals validate and justify their knowledge.	King and Kitchener (2004)
Ways of knowing	Women's beliefs about knowledge and the knowing process.	Schommer-Aikins and Easter (2009)
Epistemological reflection	Assumption's individuals hold about the nature of knowledge A student understanding about the nature of his/her knowledge and knowing.	King & Kitchener (2004)
Personal epistemology	An individual's belief about knowledge and the knowing process.	Hofer & Pintrich (1997)

Note. These sources represent the seminal researchers in the field of epistemological belief studies.

The common element in all these definitions is that personal epistemology is a set of beliefs that individuals hold about how we come to know and the nature of that

knowledge. It is generally accepted among researchers that those beliefs included the source, certainty, and structure of knowledge (Hofer, 2006). Schommer-Aikins (1994) later added ideas about learning to epistemological beliefs.

Perry

William Perry was the pioneer researcher of epistemological beliefs. According to Hofer (1997), Perry discovered, through his investigation of college freshman at Harvard University in the early 1950s, a connection between student academic achievement and epistemological development. As college freshmen at Harvard evolved in their studies, their views on knowledge changed. Hofer (1997) stated,

> Perry was the first to suggest that how college students made meaning of them educational experiences were not a reflection of personality but an evolving developmental process. He provided an interactionist model for interpreting student's epistemological responses to college environment. A central contribution of the scheme has been the articulation of the dualistic, multiplistic and relativistic points of view that characterize the epistemolo-gestalt outlook of many college students. The popularization of Perry's work has made the teaching of students at these levels more explicable to a generation of college faculty (p.12,13).

Perry (1999) developed his model of epistemological development while at Harvard University as the director of the Bureau of Study Counsel. Perry began studying the experiences of male students at Harvard. He was particularly interested in how students confronted epistemological pluralism while in college. After studying this for

over four years, Perry developed a model of intellectual development which focused on how students understood the nature and origins of knowledge. His original sample had a male bias which later fostered research by feminist researchers. This resulted in the expansion of his model.

Perry's (1999) model was considered a developmental model (Hofer, 2006; Schommer-Aikins, 2004). There is evidence that Perry (1999) did not view his model as developmental. It is, however, widely considered by researchers as developmental (Hofer, 2006). Perry (1999) characterized his model as a form or structure rather than as stages. Perry (1999) stated, "These forms characterize the structures which the students explicitly or implicitly impute the world, especially those structures in which they construe the nature and origins of knowledge, of value and of responsibility" (p.1). Perry's (1999) unit of analysis was college male freshman. Although later researchers would criticize Perry (1999) for this, the rationale for the male focus may have been that males represented a convenience sample. Perry (1999) conducted two longitudinal studies and constructed his developmental scheme from the findings. According to Perry (1999), the theoretical framework for his scheme was derived from two basic sources, Adorno, Frenkel-Brunswik, Levinson & Sanford (1950) and Stern (1953). Adorno et al. (1950) was responsible for research on personality and Stern (1953) developed a belief measurement scale known as A Checklist of Educational Views (CLEV). Perry's (1999) research methodology was based on interviews and a paper and pencil belief inventory administered to a random sample of students from the mid-1950s through the '60s. Subsequent researchers within the field adopted Perry's (1999) methodology. Thus, many

researchers in the field of epistemological development have developed epistemological belief surveys. These include the Epistemological Questionnaire (EQ), Epistemic Belief Inventory (EBI) and Epistemological Beliefs Survey (EBS; Schraw, 2013). Schommer-Aikins (2004) stated,

> The study of personal epistemology was originally based on in-depth interviews, thick descriptions of students' responses and well-elaborated stage schemes of epistemological development. This research began with Perry (1968) studying Harvard undergraduates. Many researchers who advanced Perry's work continue to use interviews and continue to use thick descriptions of epistemological development (p.19).

Perry (1999) administered the CLEV in 1954 and 1955 to a random sample of 313 students. They were first given the CLEV in 1953 and again in 1954. In addition, they were interviewed. The students were also interviewed. Further studies were conducted in 1962 and 1963 to freshmen. Later in 1962 and 1963, Perry (1999) conducted a similar study on college freshman. These longitudinal studies were the basis of the developmental scheme. The limitation of Perry's (1999) approach was that his conclusions were drawn from a limited sample of male college freshmen at an elite school. These students were not representative of college freshmen across the country. Therefore, any conclusion about epistemological development derived from his model could only be tentative. According to Perry (1999), college students' epistemological stance toward the world progressed from a view where knowledge consists of right or wrong propositions finalized by an authority to a position where evidence for

propositions is contextual with evidential standards differing by domains. Also, anyone can be an authority on knowledge depending on expertise, skill and opportunity. Perry (1999) concluded that all students have epistemological positions about the world. Perry's (1999) main contribution was that he was one of the first investigators to connect epistemological development to achievement. However, Perry's (1999) model was limited because it was based on college male freshman at Harvard. Results from Perry's (1999) longitudinal study motivated decades of researchers to seek a concise understanding of the relationship between epistemological beliefs and student achievement.

Perry (1999) conceived of students' epistemological beliefs as part of a broader schema used to organize the student's perception of the world. Perry (1999) stated: "These forms characterize the structures which the students explicitly or implicitly impute to the world" (p.1). Thus, as an organizational perceptual framework, epistemological beliefs provided the foundation for forming and evaluating knowledge claims about the world. Furthermore, the world was expected to conform to the epistemological belief structure. Perry (1999) stated, "in this report, the word "structure refers specifically to the formal properties of the assumptions and expectancies a person holds at a given time regarding the nature and origins of knowledge and value" (p.47). Freshman students who held the naive absolutist position expected professors, as intellectual authorities, to provide them with final answers and facts. The truth value of a statement was based on the authority which pronounced the claim. Perry (1999) found that student achievement was affected by naive epistemic positions because their

expectancy that the professor would provide the final answers to questions clashed with the professor's goal of promoting critical thinking and assessment of evidence. Freshman often learned to their consternation that professors would not supply them with final answers. There have been interviews that illustrates how students were often destabilized in their freshman year (Perry, 1999).

Perry (1999) outlined nine epistemic positions that students held in their intellectual development. Perry (1999) proposed a unidimensional model (Duell & Schommer-Aikins 2001). In unidimensional theories of epistemological development, one area of development is dependent on other areas of development. Thus, an individual's development in position influenced development in position six. Developmental epistemological theories generally move from a naive dualism to commitment and then to a contextualistic relativistic view of knowledge. Since the inception of Perry's (1999) scheme, there have many epistemological theories modeled on the developmental scheme. Table 3 outlines the epistemological models developed from Perry's (1999) scheme.

Table 3

Developmental Models Associated With Perry's (1999) Work

Theorist	Model name
Perry (1999)	Perry's Scheme
Belenky et al. (1986)	Women's Ways of Knowing
Baxter Magolda (1992)	Epistemological reflection model
King & Kitchener (1999)	Reflective Judgment
Kuhn (1991)	Skills of Argument

Note: Table 3 shows from left to right developmental epistemological belief models based on Perry's (1999) original scheme.

Many of the developmental theories outlined in Table 3 were constructed based on reactions to many of the flaws in Perry's (1999) scheme. For example, Belenky et al. (1986) investigated how women develop epistemological beliefs because of the male focus of Perry's (1999) sample. Table 4 maps the epistemological development for each of the nine developmental positions.

Table 4

Epistemological Development

Developmental Positions	Epistemological Development
Position one.	Students see world in terms of right and wrong, good vs. bad
Position two.	Student recognizes diversity of opinion, uncertainty, but views situation lack of understanding by authority.
Position three.	Student accepts diversity of opinions as a situation where authorities have not found the right answer.
Position four.	Student understands that there is diversity of opinions but realizes everyone is right to his or her own opinion.
Position five.	Students recognize that all knowledge and values are contextual, relativistic. Right and wrong are viewed as contextual.
Position six.	Student becomes personally committed to viewing world as relativistic.
Position seven.	Student makes an epistemological commitment to some area.
Position eight.	Students experience the real-life implications of position seven.
Position nine.	Position 6, 7, and 8 become part of lifestyle of student, life stance.

Table based on Perry (1999).

Perry's (1999) scheme had nine positions. In Perry's (1999) scheme positions 1, 2 and 3 are the beginning stage of development. At this stage, the student's worldview included the view that knowledge is right or wrong and finalized by an authority, and if

opinions on an issue exist, it is because an authority has not settled an issue. Position four is the transition stage where a student recognizes the right of everyone to have an opinion on a matter and may not accept the reasoning of an authority. Positions 5 through 9 the student perceives knowledge to be relative, contextual, and contingent. In positions, 7 through 9 the students make a personal commitment to an area of focus and understand the implications of that commitment to his or her life. Perry (1999) viewed these positions as forms but not necessarily as developmental stages. Schommer-Aikins (2004) would challenge his uni-dimensional model of epistemological development. Hofer (1997) suggested that the notion of development in the Perry (1999) scheme resulted from the inclusion of Piaget in the theoretical framework of Perry (1999). Perry (1999) acknowledged Piaget's influence on his developmental scheme. He stated,

> ...We could suppose that our development scheme reflects processes ascribed by Piaget to the "period of formal operations." It traces recapitulation (by vertical decalage) of a centrifugal movement, evident in the sensory-motor and concrete operational periods. The movement is away from naive geocentricism to a differentiated awareness of the environment. This awareness reflects to a new and differentiated awareness of self and to make possible a complex dynamic equilibrium between self and environment (p.229).

In Perry's 1999 developmental scheme can be mapped on to Piaget's developmental framework. The student who believes in a dualistic view of knowledge are located at naive egocentrism on Piaget's model (Perry, 1999) Schommer-Aikins (1994, 2004) diverged from Perry's (1999) developmental scheme by proposing a hypothesis that

epistemological beliefs are independent. Individual beliefs may change but not developmentally.

There are theoretical issues with Perry's (1999) scheme. Not enough is known about the influence of personality structure or the influence that culture has on the developmental scheme. Perry (1999) does acknowledge that a crucial moment for the student comes when a transition is made from dualism to a relativistic commitment. Perry (1999), unlike Hofer (1997) and Schommer-Aikins (2004), perceived that his study only had indirect relevance to educational policy makers at the post-secondary level. Perry (1999) believed that policy makers could only indirectly affect developmental progress. According to Perry (1999), educators cannot manipulate students to grow. Bendixen et al. (2010) and Hofer (1997) would challenge this idea. Perry's (1999) notion was that epistemological growth could only be accomplished through indirect changes in the curriculum and exposure to the classroom environment. Perry (1999) stated

> In our reports, the most difficult instructional moment for the students – and perhaps for the teacher as well – seems to occur at the transition from the conception of knowledge as a quantitative accretion of discrete rightness... to the conception of knowledge as the qualitative assessment of contextual observations and relationships. (p.236)

The nine positions in the Perry (1999) combine knowledge and value. Stages 6 through 9 involve the student making a value commitment to an intellectual position. At this stage, evaluation of knowledge involves a blend of context, observations, and relationships. Thus, knowledge cannot be arbitrated by a single authority. Perry (1999) stated that at

positions eight and nine the students realize that "epistemologically the knower and the known are inseparable. The forms of knowing entwine with the forms of known and this involvement include the forms of the knower's responsibility" (p.238). Therefore, educators cannot manipulate growth through the positional stages. Therefore Perry (1999) concludes that educators at the post-secondary level can only have an indirect effect on the growth of the student through the developmental stages. Perry (1999) stated: "Confirmation of the growing person in any community is a matter of art, and in large part implicit" (p.240). This is important because Perry's (1999) map of epistemic development was not intended to directly, through policy actions, alter college curriculum. The natural experience of a liberal arts curriculum would help the student to evolve.

Perry's (1999) model is limited by two important factors: its scheme was not based on representative samples of college students across the country but from longitudinal studies from male-only Harvard freshmen and its lack of recommendations for action to address students' epistemological development. These deficiencies motivated further researchers to investigate epistemological development from the child to the adult (Hofer, 2001). Schommer-Aikins (1991, 2001, and 2004) the findings represent a significant break from Perry's model 1999) because of six innovations:

1. Epistemic development includes beliefs about knowledge.
2. Epistemological beliefs are distinctly identifiable beliefs.
3. Epistemic beliefs are independent and may not develop together.
4. Epistemic beliefs should be balanced.

5. The term epistemological belief or epistemic belief.

6. Quantitative methodology to investigate epistemic beliefs.

Schommer-Aikins (2004) recommended that college-level faculty directly assess students' epistemological beliefs. Schommer-Aikins (2003) stated, "Since student's epistemological beliefs can change over time and academic experience (Perry1999; Schommer 2004), college faculty may want to assess students' epistemological beliefs" (p.364).

Schommer-Aikins

Schommer-Aikins' (2004) central contribution to the field of epistemological research was her introduction of the multidimensional epistemological belief framework and the idea that epistemological beliefs could be measured quantitatively. There were several epistemological belief surveys (Duell & Schommer-Aikins, 2001). Also, several researchers introduced versions of epistemological belief assessments that were modifications of Schommer-Aikins (2001, 2004) epistemological questionnaire.

In 1991, Schommer-Aikins proposed a quantitative model of assessing epistemological beliefs that were based on five features of an epistemological belief system that distinguished it from previous models. The Schommer-Aikins (2004) innovation was to add beliefs about learning and the identification of distinct beliefs about knowing. Schommer-Aikins (2004) hypothesized five beliefs about knowledge and learning. These hypothesized beliefs were to become the basis of her quantitative assessment of epistemological beliefs. Table 5 shows Schommer-Aikins (2001, 2004)

five hypothesized beliefs that became the basis of the 63-epistemological belief questionnaire.

Table 5

Schommer-Aikins Model

Epistemological belief	Meaning
Stability of knowledge	Unchanging to permanent
Structure of knowledge	Isolated facts to integrated whole
Source of knowledge	Omniscient authority to evidence for belief
Speed of Learning	Knowledge is gained quickly or gradually
Ability to Learn	Fixed ability to learn vs. learned through education

Table 5 illustrates the five epistemological beliefs (left column) and the meaning (right column).

Each one of these beliefs was a distinct entity. Therefore, individuals would be measured as to the effect of an independent belief on an aspect of learning or some other academic achievement. This was a direct contrast to the research program of Perry (1968, 1998). Later researchers could use the Schommer-Aikins (1998) model to identify the power of specific beliefs. This also added to the idea of asynchronous development. Individual's beliefs may not necessarily develop together. This was a revolutionary departure from the stage models of previous researchers (Duell et al. 2001).

Schommer-Aikins (2004) also introduced the idea of epistemological belief. The idea of belief had not been used by previous researchers. Perry (1999) used scheme and developmental positions. Schommer-Aikins (2004) introduction of belief into the personal epistemology field was justified by Schommer-Aikins (2004) claiming an

individual's personal epistemology resembled a belief system. Schommer-Aikins (2004) stated, "The reasoning behind this was that personal epistemology seems to have many characteristics that are typically ascribed to beliefs in general" (p.21).

Schommer-Aikins (2004) developed a 63-question inventory to assess the hypothesized beliefs. Also, the inventory was tested psychometrically (Schommer-Aikins, 1990). Schommer-Aikins (1990) factor analysis results were: Structure of knowledge .79, source and certainty of knowledge .68 and speed of knowledge .62. The questionnaire was later modified by Schommer-Aikins (2004) and other researchers (Jehng, Johnson & Anderson, 1993; Schraw, Bendixen & Dunkle, 2002). DeBacker et al. (2008) challenged Schommer-Aikins (2004) and other belief inventories as containing components that measured learning instead of epistemological beliefs. DeBacker et al. (2008) concerns will be addressed in a later section of this review.

Schommer-Aikins (2004) Epistemological Belief Inventory is considered the most widely used and adapted questionnaire within the field of personal epistemology (Schraw et al., 2017). This makes the Schommer-Aikins (2004) Epistemological Belief Questionnaire important. Schommer-Aikins (2004) introduced several innovations in the field of personal epistemology. The following literature review examines the scholarly literature that Schommer-Aikins (1989) has contributed to the field epistemological belief based on contributions to the field.

Hofer

Hofer (1997) had been primarily concerned with theoretical and methodological issues within the field. Also, Hofer's (1997) research interest involved translating

epistemological research to the primary and secondary level of education. Hofer (1997) investigated three central issues in the field of personal epistemology: dimensions of epistemology theories, domain differences in epistemological theories and how college students interpret instructional practices epistemologically. Hofer's (1997) research has raised many issues in the field of personal epistemology. One of which is the call for more clarity in the construct. Hofer (2005) stated, "The primary issue raised in our initial article on the topic was the nature of the construct including concepts about naming, definition, construct boundaries and dimensions." (p.98). Hofer (2005) acknowledged that four dimensions of epistemological belief were widely accepted within the field of personal epistemology: certainty and simplicity of knowledge and the source and justification of knowledge. The speed of learning and quick learning has been challenged as measuring epistemological beliefs by Hofer (2005) and other researchers as measuring epistemological beliefs. Hofer (2006) concluded that epistemological beliefs have domain-specific aspects. Disciplines are partly distinguished from one another by different standards of evidence which determines what is accepted as knowledge within the discipline.

Although epistemological beliefs of individuals generally develop from naive to relative or contextual, that development for the individual is shaped by exposure to the epistemological rules and goals of disciplines. The issue of domain specificity has implications for this study because principals are managers and therefore participate in the domain of management and leadership. If epistemological development of individuals is influenced by exposure to the epistemological demands of specific disciplines, then

epistemological development of principals may be influenced by the epistemological requirements of leadership and management. Senge (1990) acknowledged this point in his model of leadership. He concluded that mental models affect how problems and decisions are framed within organizations.

Summary

In conclusion Perry (1968, 1999), Schommer-Aikins (2004), and Hofer (1997) contributed to the main currents within the field of epistemological beliefs and are relevant to this investigation because of the connection made between epistemological beliefs and student achievement. Both Schommer-Aikins (1990, 2000, and 2001) and Hofer (1997, 2005) advocated that the findings of epistemological research be used to promote student and achievement at the primary and secondary level and to improve the teaching practice. Perry (1999), pioneer of epistemological belief research, connected student achievement and epistemological development.

Schommer-Akins's (2004) findings were that epistemic development includes beliefs about knowledge, epistemological beliefs are distinct, identifiable beliefs, epistemic beliefs are independent and may not develop together, epistemic beliefs should be balanced, the term epistemological belief or epistemic belief and quantitative methodology to investigate epistemic beliefs. Schommer-Aikins (2004) also introduces the first quantitative epistemic belief measurement (Clarebout et al., 2001). It is the most widely used epistemological belief instrument used in research (Schraw, 2013). Hofer (2005) raised concerns about the methodology and theory development of the field. In addition, Hofer (1997) proposed translating epistemological research to the primary and

secondary levels. Hofer et al. (1997) connected student achievement at all levels of education to epistemological development. Furthermore, Wildenger et al. (2010) proposed modifying teaching practices based on the findings of researchers.

The findings of Perry (1999), Schommer-Aikins (2001) and Hofer (2005) support the conclusion that epistemological beliefs are an important factor in student achievement. Hofer (2002) specifically advocated the idea that student achievement could be improved by understanding the epistemological beliefs of students and teachers in elementary and high school. Hofer's (2001)'s findings support the idea that epistemological beliefs of teachers and students are linked to the achievement of school success.

Perry (1999), Hofer (1997), and Schommer-Aikins (1994) represent the seminal research in the domain of epistemological beliefs. Their findings did not make a connection to student achievement and the achievement of school success by principal leadership. Hofer (2005) and Schommer-Aikins (2004) collectively found that epistemological beliefs affect comprehension of secondary students. Moreover, teachers' epistemological beliefs affect student achievement at all levels. However, neither Hofer (2002) nor Schommer-Aikins (2004) related their findings to the influence of principal leadership, epistemological belief, and student achievement.

Literature Review Related to Key Variables and Concepts

Markauskaite and Goodyear (2017) provided a wide theoretical overview of how epistemic tools "provide form and structure to professional ways of knowing" (p. 369).

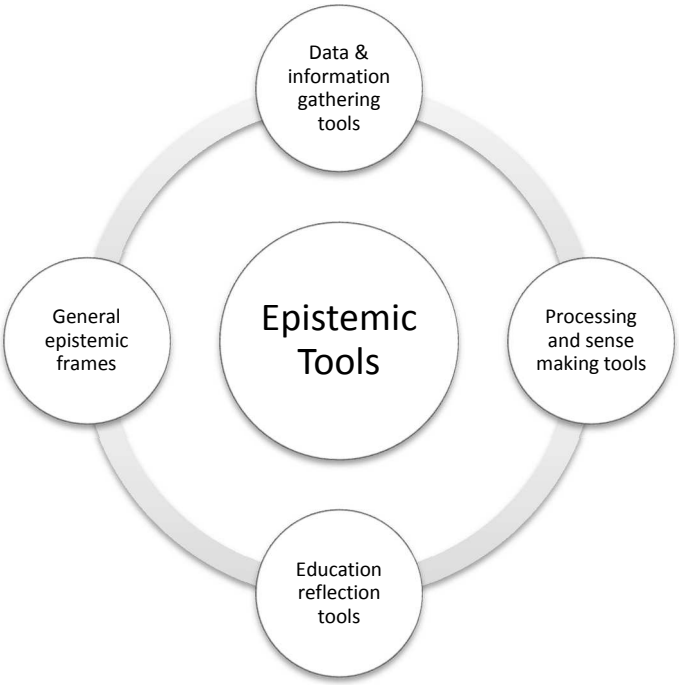
Regarding what can be considered epistemic tools, Markauskaite and Goodyear stated the following:

> By "epistemic tools" we mean all classes of material and symbolic activities, including those employed in human discourses, that are used to shape inquiry and knowledge -producing action. In professional learning and work settings, this includes structuring resources, and other tools that shape professional inquiry- such as concepts, standards, frames of inquiry, heuristics, and codes, as well as other knowledge resources as external media. (p. 242).

Markauskaite and Goodyear provided a broad critique of personal epistemological research. In short, they acknowledge that more research needs to be done on the differences between the notion of "epistemic" and epistemological beliefs. In their words "more research needs to be done on how to "provide a richer insight into how personal epistemic understandings are intertwined with knowing in situated activities" (p.169). However, despite their critique, Markauskaite and Goodyear concluded that studies in the field of personal epistemology have established that personal epistemology affects the following areas: problem-solving, learning task, complex problem solving, judgment, and innovation. Figure 1 provides an overview of epistemic tools. I created the illustration based on the work of Markauskaite and Goodyear.

Figure 1

Epistemic Tools



Four out of 17 epistemic tool relationships are identified. These relationships are important for understanding the role that epistemology may play in principals' personal epistemological frames that contribute to their decision-making processes in schools that have an SPQR rating of 1 or 2 in the LUA schools. Personal epistemological frames of professionals may influence sense-making capacities of principals as far as it relates to complex problem solving and judgment. A deficiency in most studies is that little is known about the role that epistemological frames affect how principals make decisions which result in school success, in any context. This dissertation seeks to add insight into this area.

AYP and Leadership

Leal-Soto and Ferrer-Urbina (2017) administered a Spanish version of the Epistemic Belief inventory to 1,785 Chilean high school students. Leal - Soto et al. (2017) concluded that a three-factor model was confirmed, and reliability was comparable to other studies. Furthermore, the results of this study reveal several problems with measuring epistemological beliefs. Leal-Soto et al. (2017) stated,

> …this evidence questions the usefulness of the EBI to properly address epistemic beliefs; rather, it could be considered to provide an approach to the evaluation of the embedder systemic model of epistemic beliefs proposed by Schommer-Aikins, incorporating the distinction between beliefs about knowledge and beliefs about learning, and distinguishing the relational dimension, that in the case of the EBI, assimilates to disposition toward authority, which can be understood as a relational factor that influences the second-hand evaluation proposed by Bromme, Kienhues and Porsch. This fact has theoretical relevance since it provides evidence that supports Schommer-Aikins' reformulation of his model, moving from the schema of epistemological beliefs that include beliefs about learning, to a model that distinguishes the strictly epistemological beliefs from beliefs about learning and other beliefs such as those about the relational dimension involved in evaluating knowledge from sources external to the subject, highlighted by. (p.16)

Thus, there are issues with the stability of administering epistemic belief inventories. Leal-Soto et al. (2017) investigated 29 belief instruments designed to measure Schommer -Aikins epistemological belief model. Leal-Soto et al. (2017) found that all belief

inventories had issues with the epistemological five-factor model that made epistemological inventories as administered in research studies difficult to integrate into the research. Leal-Soto et al. (2017) focused on the Epistemological Belief Inventory (EBI). This inventory was designed to reform some of the psychometric issues with the original EQ model. The EBI model is five-dimensional as the original EQ model. However, those five dimensions are reformulated as a source of omniscient authority, quick learning, simple knowledge, and innate ability. Leal - Soto et al. (2017) recommends that researchers administering epistemic belief questionnaires make it clear as what dimensions are being used and all the items being used. This study is relevant to the literature evaluation because it shows the complications and problems in measuring epistemic beliefs when also connecting other variables to the measure. In addition, Leal-Soto et al. (2017) high light a limitation of most studies using epistemological inventories. They were conducted both in and out of U.S. on mostly students. Thus, many of the conclusions obtained from these studies are very difficult to integrate and create a unified model of epistemological beliefs. The purpose of the cross-validation study was to establish an instrument that can be used by researchers and to foster the integration and comparison of findings of multiple studies. Instead of dismissing the epistemic belief inventories, Leal - Soto et al. (2017) state that users of this instrument need to make it clear what dimensions of the inventory are being used. Doing this will make the evaluation of results more reliable. This study is important to this investigation because Leal-Soto's study highlights issues with epistemological belief inventories and possible research strategies to overcome them. Additionally, Leal-Soto identifies the limitation of

most epistemological belief studies that have been administered to students. This study broadens the reach of epistemological belief studies by administering the EQ to principals of k-8 public schools.

Steinberg and Cox (2017) assessed the reform efforts over fifteen years. His guiding question was, how effective have reform efforts been? An answer to this question could provide both policy makers and practitioners with information on how to further develop effective strategies for reform in urban districts. Steinberg et al. (2017) stated that one of the purposes of his research was to "provide information to policy makers and practitioners serving students in urban school districts, we document examples of policy reforms in urban school settings that show promise as effective strategies" (p.192). Steinberg et al., (2017) outlined four actionable "take aways" for both policy makers and practitioners: one. Early childhood education needs to have qualified teachers, 2. School districts need to embrace teacher evaluation systems that provide teachers with detailed feedback during post-observation conferences 3. High stakes testing should be continued. However, more emphasis should be placed on teacher effective use of data. Some choice-based reforms work and should be examined. (Steinberg et al., 2017). Steinberg (2017) addresses the issue of high stakes testing and the side effects of using them. However, he concludes that because teachers need to be data-driven, there are no alternatives which provide data to teachers other than test. Steinberg's et al. (2017) focus in some way on teachers: qualified teachers; teacher evaluation systems; teachers using data to guide instruction. None of the Steinberg et al. (2017) "takeaways" focus on leadership factors that affect AYP.

Saleem and Fayyaz (2017) examined whether there was a relationship between epistemological development using the Perry (999) model and age, wisdom, gender, and education. He used a convenience sample of 83 men and 67 women. Saleem et al. (2017) found that there was a positive correlation between epistemological development and age, wisdom, and education. However, he found that age was not significantly correlated with young adults and middle-aged adults. This study further supports the notion that epistemology beliefs affect adult behavior. This indirectly supports the purpose of this dissertation which is to examine the relationship of epistemological beliefs of K-8 principals with school success. How do principals' epistemological beliefs factor into school success? The results of Spiess (2017) shows that both mindset and epistemic beliefs are predictors for cultural proficiency development. Spies (2017) suggest that human resources measure candidates' mindset and epistemic beliefs.

Relevance

This study was relevant for this review of the literature because it links personal epistemological beliefs to cultural proficiency and then recommends that personal epistemological beliefs are measured by human resource departments when hiring. This study used the personal epistemological framework of Schraw (2002). Spiess (2017) states, "All questions were taken directly from the Epistemological Beliefs Inventory (Schraw et al., 2002). Schraw et al. identified this domain as omniscient authority, here it is being represented as a source of knowledge." (p.53). Thus, Spiess (2017) recommends administering the Epistemological Belief Inventory to prospective teachers. Furthermore, Spiess (2017) concludes that source of knowledge is the predictor for cultural proficiency

development. This study, as others cited in this review of the literature, shows that epistemological beliefs of individuals influence many areas of one's professional life.

Aydin, Selcuk, and Cakmak (2018) studied the canonical correlation between preservice teachers, life-long learning, and epistemological beliefs. They found that epistemological beliefs and lifelong learning beliefs were canonically correlated with an effect size of 34%. This is important for this dissertation because it shows that epistemological beliefs are a significant predictor of life- long learning. This conclusion indirectly supports that need for understanding the effects of epistemological beliefs of K-8 principals and school success. If epistemological beliefs affect lifelong learning goals, then it could easily affect other areas such as principals' school-wide decision - making behavior.

Getahun, Saroyan, and Aulls (2016) investigated undergraduate students' conception of inquiry in relationship to epistemic belief differences. Getahun et al. (2016) administered two questionnaires to 80 females and 27 male students. One questionnaire was an open-ended questionnaire, and the other was the Schommer epistemological belief questionnaire. The study showed a relationship between epistemic beliefs and inquiry. Getahun et al. (2016) conclude that because epistemic beliefs are a factor in inquiry among students, epistemic beliefs should be measured. This study is important for two reasons. It, like others, shows the relevance of using Schommer's (2002) Epistemological inventory to measure epistemic beliefs, and its relevance is shown as far as Getahun (2016) recommends measuring the epistemological beliefs of students

Chiu, Liang, Hou, and Tsai (2016) extended the study of epistemic beliefs to those of medical students as epistemic beliefs relate to medical knowledge. Chiu et al. (2016) found "that it may be beneficial for medical educators to better understand medical students' epistemic beliefs regarding medicine" (p.1). Chiu et al. (2016) administered the Medical Specific Epistemic Beliefs Questionnaire (MSEB) to 340 medical students in Taiwan. The MSEB was validated using structural equation modeling, confirmatory factor analysis, and path analysis. Chiu et al. (2016) found that students with multi-source knowledge beliefs were suspicious of medical knowledge transmitted from authorities. Chiu et al. (2016) concluded that epistemic beliefs affected students' approaches to study medicine. Chiu et al. (2016) stated,

> …it was found that medical students with sophisticated epistemic beliefs (e.g., suspecting knowledge from medical experts) did not necessarily engage in deep approaches to learning medicine. Instead of a deep approach, medical students with sophisticated epistemic beliefs in uncertain and justifying medical knowledge intended to employ a flexible approach and a mixed approach, respectively. (p.1)

Chiu et al. (2016) were important to this research because this study shows that epistemic beliefs affect how medical students make decisions about what authorities to accept. This shows that epistemic beliefs have a wide-ranging effect from teacher instruction to student learning in any context. The context may shift in terms of subject matter, but the impact of epistemic beliefs on decision making, problem-solving, and learning, in general, is significant. Buske and Zlatkin-Troitschanskaia (2019) found that

principals and teachers have a core power relationship in which teachers are inclined to mimic the leadership style and demands of the principal. This teacher mimicking, among other things, how principals use data with their schools to make decisions. This fact makes it important to understand the influences that impact how principals make decisions. Buske and Zlatkin-Troitschanskaia (2019) concluded that there is not enough understanding on what factors determine how principals use data. Buske and Zlatkin-Troitschanskaia (2019) stated, "Epistemological beliefs are of particular importance for the successful implementation of knowledge in real life situations (p.6)." Thus, Buske (2019) identified epistemological beliefs an important and legitimate factor that must be understood in principal decision making within schools.

Buske (2019) based their hypothesis around two central notions: principals who held immature epistemological beliefs were less inclined to use external data in their decision making. The corollary to this was that principals with mature beliefs would be inclined to use external data. They selected 297 principals from 153 schools using structured equation modeling. They found that epistemological beliefs and attitudes towards evidence had a slight impact on how data was used. This study is important to this dissertation because it shows the relevance of epistemological beliefs as an object of study in principal leadership. Furthermore, this study shows that a significant understanding of how principal decisions leading to successful schools can be gained from linking epistemological beliefs to effective leadership.

Breger (2017) found that family income has long been considered an important and critical factor in student achievement. However, Breger (2017) concludes that there

are additional factors which also impact student achievement: school size and attendance. Breger (2017) states.

> The results of this analysis provide some clear evidence that achievement of schools in the Chicago Public School district is highly correlated with poverty. Test scores are significantly lower for impoverished schools, indicating that these schools face higher pressure to meet state standards than neighboring schools with students from higher income homes. Chicago makes an interesting case study in determining how family income correlates with urban education. We are motivated to think about how thousands of students could benefit from administrative policies that attempt to raise achievement despite the economic hardships their students face. (p.213)

Breger acknowledges that Chicago Public Schools (CPS) is unique because poverty has a significant impact on student achievement. This is very important because many of the reform measures focus on the impact that teachers have on students regarding classroom instruction. Failing schools are often blamed on teacher practices and principal leadership. AYP remains a significant factor in school closings. Breger (2017) stated,

> Evaluating school performance in terms of "good" or "bad" might help us understand how schools react to state and federal standards. For example, we can see that out of 455 schools that have reported AYP, only about 57 schools have met this standard in the year 2013. This low number means that a great majority of the schools in CPS are "failing" and face consequences like the restructuring of the school (i.e., curriculum, teaching staff, administration changes), which would

> be very costly. Even worse, schools that fail to meet AYP face losing government financial support. (p.209)

Breger's (2017) research was important because it shows that student achievements in the LMUSD are linked to poverty, which can be addressed by policies of local, state, and federal government but is not in direct connection to instruction. Breger (2017) shows that reaching AYP may be connected to the level of poverty. This research has further importance to this study because it shows that AYP is an effect variable that, in this study, is linked to poverty. However, if AYP is an effect variable, how do epistemic beliefs affect the decisions principals make which lead to school success.

Winberg et al. (2018) studied the connection between students' epistemic beliefs and achievement. Their study is in the mainstream of most epistemological belief research. The focus is usually on teaching or the effect of epistemological belief on student behavior. Winberg et al. (2018) conducted a three-year cross-sectional longitudinal study of students in the age range of 5-11. They found that there was a weak connection between epistemological beliefs and achievement goals. Winberg et al. (2018) stated,

> This study's results show that the relationship between EB and AG is not straightforward. Though naïve beliefs were in general associated with performance goals and sophisticated beliefs with mastery goals, this relationship did not apply for all beliefs and for all grades. (p.14)

Although the results of this study indicated a weak correlation between epistemological beliefs and student achievement goals, it did show that there was a positive relationship

between sophisticated beliefs about justification with mastery goals and performance goals were positively correlated with performance goals. This study shows that epistemological beliefs have a complex and dynamic impact on behavior. This further supports the purpose of this dissertation which is to understand how epistemological beliefs of principals as a factor in school success.

Schechter et al. (2017) conducted a qualitative study of 59 school principals in Israel on how school reform implementation affected them. Although the study was conducted in Israel, the findings about the impact of school reform measures and the role principals play within the school are consistent with principals within the U.S. Schechter, et al. (2017) view principals as mediating agents of reform. Reform measures success depends on how well they are embraced and implemented by the principal. Schechter et al. (2017) stated: "A school principal may be seen as the one who stands at the actual doorstep, between the extra and intra school worlds" (p.243). The authors of this study found that principals must negotiate their way through three general realities, they must adjust to the existing realities, care for teachers, and use discretion. As mid-level policymakers, Schechter et al. (2017) conclude that principals leave their "fingerprints" on the policies they must implement. The notion that principals are midlevel policymakers whose fingerprints are on the very policies they implement shows the power and importance of principals. This study is important for this dissertation because it supports and reinforces the need to understand the role that epistemological beliefs of principals play in day to day decisions which lead to successful schools.

Flores (2017) provided a critique of what she views as “neoliberal” reform policies and how they have endangered the existence of public schools in the U.S. Flores (2017) acknowledges that NCLB act and subsequent reform ESSA act of 2015 have given parents more choice. However, they have not, in her view, given parents the High-Quality education promised. In this critique, Flores (2017) poses the question given the data showing that charter schools have not lived up to their promise, what is the purpose of them? Her answer as stated is to “provide a set of skills that will allow them to enter the workforce at the bottom taking low paying jobs…” (p.2). Flores's (2017) suggested that people must demand that their local and national governments make the necessary changes so that every child receives that high-quality education which will make their choices in life more effective. This critique is important for this dissertation because it provides a history of the impact of the NCLB and ESSA educational reforms. It also shows the side effects of well-intended legislation.

Schraw et al. (2017) reviewed over 40 years of research on teachers’ personal epistemology. He begins with a definition of personal epistemology, which draws from Hofer et al. (2002). He states, “Personal epistemology is concerned with the origin, nature, limits, methods, and justification of human knowledge. It relates the beliefs and cognitions an individual holds about the nature of knowledge and knowing…” (p.4). He acknowledges that understanding teachers’ epistemologies helps to understand “classroom instruction, which in turn influences how teachers learn” ... (p.4). There are five themes on personal epistemology highlighted in this volume.

First, teachers should acquire an epistemological lens. This epistemological lens enhances their teaching reflections. Second, understanding one's conceptual filters will make one more proficient in their craft. Third, epistemological development and change can be very slow. Fourth, it matters if we can change our epistemological views and finally, using evidence in the classroom helps us to develop our epistemologies. This text is significant to this dissertation because it provides support for the impact of epistemological beliefs of teachers on students. Furthermore, the text shows the importance and value of having teachers develop their epistemologies. Over the years there has been little research done in the area of the impact of principals' epistemological belief on overall school success. The only research done on epistemological beliefs of principals or administrators was done by the following researchers: Arredondo and Rucinski (1998), Varaki (2003), Seals (2011). Thus, Schraw et al.'s (2017) volume surveying 40 years of research on teacher's epistemology supports the rationale for this dissertation. Through focusing on the epistemological beliefs of K-8 principals, this investigation will add additional knowledge to the principal leadership factors which influence the achievement of school success.

Summary and Conclusions

In this section, the seminal personal epistemological theories of Perry (1999), Hofer (2001) and Schommer-Aikins (2004) were reviewed. These theorists laid the foundation for present-day epistemological belief research. Each theorist concluded that epistemological beliefs of students impacted student achievement. Perry's (1968,1999) studies focused on male College freshmen, Hofer (2001)) proposed translating findings of

epistemological researchers to the primary and secondary levels, and Schommer-Aikins (2004) conducted empirical studies on the impact of epistemological beliefs on elementary, high school, and college students. Also, Schommer-Aikins (2004) introduced the Schommer-Aikins (2004) epistemological belief questionnaire. This was the first instrument to quantitatively measure epistemological beliefs. It is the most widely used measurement instrument in the field (Schraw et al., 2017).

This section of the dissertation also reviewed research that, although dated, was aligned with the purpose of this study, understanding the relationship between the epistemological beliefs of K-8 principals which impact school success. In this context, these studies are seminal. These early researchers who focused on principal leadership and epistemological beliefs were Arredondo and Rucinski (1996, 1998) and Varaki (2003). Arredondo and Rucinski (1996, 1998) conducted her studies on Chilean and U.S. educators and principals. The primary conclusion from these studies was that principals' epistemological beliefs influence decisions about curriculum and the kind of school-wide reform innovations to adopt.

Varaki (2003) investigated the relationship between epistemological beliefs of primary and secondary principals in Iran. Varaki (2003) concluded that there was a connection between leadership style and epistemological beliefs of administrators. The limitations of these studies on epistemological beliefs of principals were that they did not provide any insights into the impact of epistemological beliefs on the achievement of school success measured in their prospective environments.

Finally, Seales (2011) connected principal leadership and epistemological beliefs and how these beliefs influence both students and teachers within schools. This study did not address how those epistemological beliefs affect school success. Seales (2011) sampled 100 principals and assistant principals from five school districts in the south. The study described the epistemological beliefs of administrators. An important conclusion drawn from the study was that principals had influence over the epistemological beliefs of students. This is an important conclusion because it shows that both teachers and students are influenced by the belief systems of administrators. Seales (2011) concluded that administrators' epistemological beliefs grow more sophisticated with time. Thus, students' and teachers' epistemological development is influenced by principals. The weakness of the Seales (2011) study is that no relationship is made between Epistemological beliefs of principals and the achievement of success. This study only focuses on the enactment of epistemological beliefs of principals within their schools. The consequences of those enactments are not discussed or evaluated. Seales (2011) is the latest study that is aligned with the general purpose of this dissertation despite the date of the research. It is one of a few studies which sheds some light on the relationship and impact of principal's epistemological beliefs on the school. As stated earlier, this dissertation focuses on how principal's epistemology impacts school achievement. Although the seminal research of Arredondo and Rucinski (1998), Varaki (2003), Seales (2011) do not represent the current research, their research focus connects directly to the focus of this research.

The current literature review of the field found that epistemological belief research focused heavily on the impact that epistemological beliefs have on student achievement through comprehension of text, self-regulated behaviors, and the relationship that the epistemological beliefs of teachers to student achievement (Schraw et al. 2017). The literature review found that no research on principals' epistemological beliefs connected to the achievement of success has been conducted. Understanding the leadership factors that lead to the achievement of school success has social value. First, more understanding of hiring effective principals will be achieved. Second, the more students that achieve success in math and reading in elementary school will lead to higher high school graduations and finally fewer schools' closings. Effective schools have a salutary effect on neighborhood development and economic stability. Thus, productive social change will be achieved.

Chapter 2 of this study reviewed the epistemological theories of Perry (1999), Hofer (2002), and Schommer-Aikin (2004) and examined the current and relevant literature on how the epistemological beliefs of principals lead to the achievement of school success. Section 3 of this study will present both the procedures and the methodology of this study.

Chapter 3: Research Method

Introduction

In this quantitative correlational study, I examined whether epistemological beliefs of K-8 principals in LMA predict school success as measured by the School Quality Rating Policy (SQRP) rating. I begin this chapter by discussing the research design and its rationale In this section, there is a review of the study variables, research design, and time and resource constraints. The next section is the methodology section. In this section, I provide details about the population; sampling and sampling procedures; procedures for recruitment, participation, and data collection; and instrumentation and operationalization of constructs. The data analysis plan and threats to validity are also described. Threats to validity that are discussed are external validity threats, internal validity threats, and construct validity threats. A description of how the respondents were protected is included in the Ethical Procedures subsection. The chapter ends with a summary of key points.

Research Design and Rationale

I conducted a logistic regression analysis to evaluate the RQ and hypotheses. A binomial logistic regression analysis is considered an inferential statistical procedure, as it attempts to evaluate the relationship between at least one predictor variable and a dichotomous outcome variable (Fields, 2017; Pallant, 2016, Tabachnick & Fidell, 2018). The independent predictor variables in this study were epistemological beliefs (continuous), which was measured using the Schommer-Aikins (1994, 2004) Epistemological Belief Inventory. I measured epistemological beliefs in the following

five domains: structure of knowledge, stability of knowledge, speed of learning, ability to learn, and source of knowledge. The dependent outcome variables were SQRP school ratings (dichotomous).

The RQ for this study asked the following: To what extent do epistemological beliefs of K-8 principals predict school success? I used a correlational design to answer the RQ for a few reasons. As Fields (2018), Pallant (2018), and Tabachnick and Fidell (2013) have indicated, a regression correlational design is appropriate for assessing a hypothesized predictive relationship between two or more variables. It is appropriate, they have noted, for determining whether the epistemological beliefs of K-8 principals predict school success. Finally, the regression correlational design was used because a linear relationship was being evaluated using continuous predictors and a dichotomous outcome variable (Fields, 2018; Peralta et al., 2018; Tabachnick & Fidell, 2018). Therefore, the regression correlational design was appropriate to answer the RQ.

The time and resource constraints for the correlational design were limited. The resource requirements for this study included that the survey instrument contain the Schommer-Aikin (2004) Epistemological Belief Inventory. This survey tool is readily available on the internet, so there was no challenge with access. Another resource used for this study was the target LMA's SQRP school ratings. These scores were also available online and posed no challenge to access. Another tool that was used in this study is the SurveyMonkey survey hosting website. Finally, time was needed for data collection and data analysis. I needed about 3 weeks to complete data collection and

about 4 weeks to complete the three phases of the data analysis process (data preparation, preliminary analysis, and primary analysis).

The use of the correlational design in this study was consistent with other studies performed in the education discipline. For example, Aydin et al. (2018) studied the canonical correlation between preservice teachers, life-long learning, and epistemological beliefs. They found that epistemological beliefs and lifelong learning beliefs were canonically correlated with an effect size of 34%. Additionally, Saleem et al. (2017) examined whether there was a relationship between epistemological development using the Perry (1999) model and age, wisdom, gender, and education. Saleem et al. used a convenience sample of 83 men and 67 women. They found that there was a positive correlation between epistemological development and age, wisdom, and education. Therefore, this current study is aligned with previous studies and may advance knowledge in the education discipline.

Methodology

Population

The general population consisted of public principals in the United States, of which there were 90,410 in 2016 (Mcfarland et al., 2017). The target population was a subset of the entire population from which sample participants were recruited. A sample refers to the participants who engage in a study (Creswell, 2018; Leedy & Ormrod, 2018). In this study, the target population was principals in the target LMA public schools. According to 2019 data from the LMA's department of education, there was a

total of 111 K-8 public school principals in the LMA at the time of the study. I drew the sample from this population.

Sampling and Sampling Procedures

I used a nonprobability convenience sampling technique to select respondents. A convenience sampling approach is not representative of the target population. A researcher using this technique simply accepts those into the study who are readily available (Creswell, 2017; Leedy & Ormrod, 2018). I chose this technique given the cost and time savings over probability sampling approaches. Weaknesses of convenience sampling include the possibility of overrepresentation or underrepresentation bias of the sample (Cresswell,2017). However, this sampling approach is easy to execute with relatively low monetary cost and time resources, relative to probability sampling (Creswell, 2017; Leedy & Ormrod, 2018).

Method for Drawing the Sample

The researcher posted an invitation containing a link to the survey on the Facebook groups of principals who work in the LMA public schools. The invitation contained the survey topic and brief description. The survey invitation was approved by Walden University's Institutional Review Board (IRB) . The survey invitation and link were also posted on an insider Facebook group called the Principals Desk. This Facebook group consists of principals working in the LMA public schools. The link took the prospective participants to the approved informed consent form and then to the survey screener once they agreed to the informed consent form. The expected time to complete the survey was 15 minutes.

Sampling Frame and Iinclusion and Exclusion Criteria

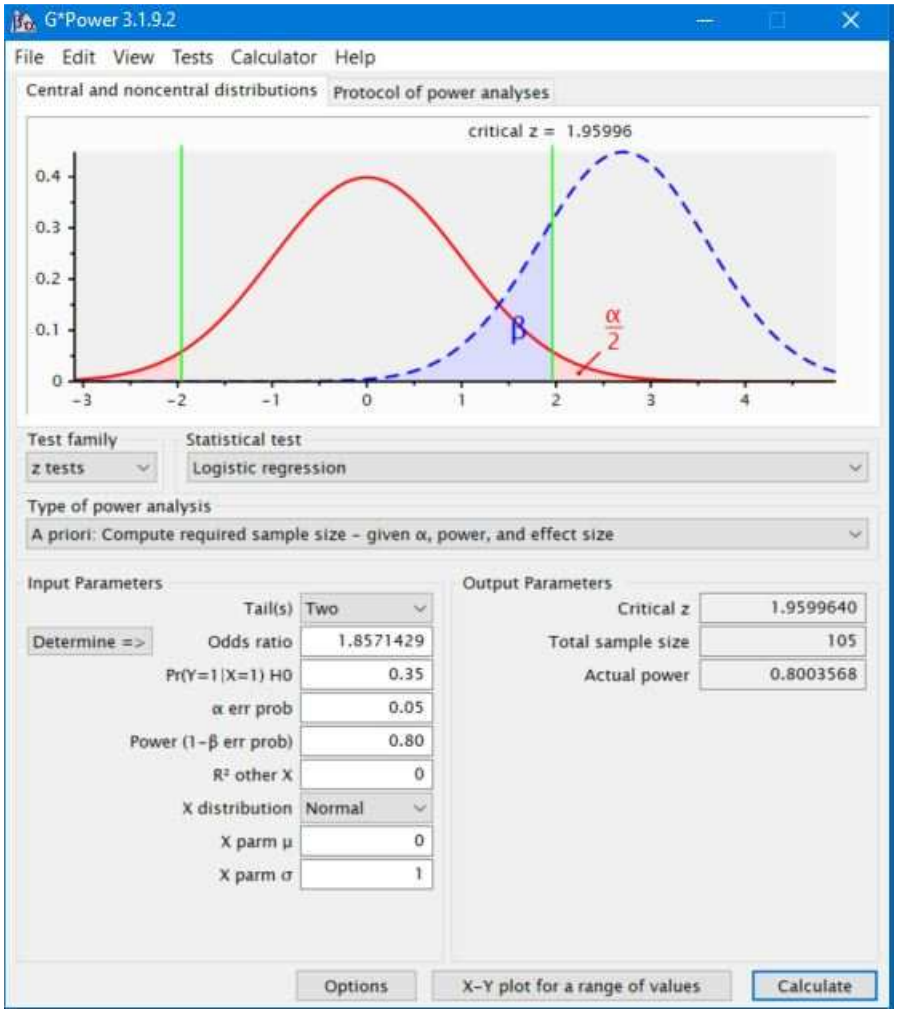
The sampling frame included all principals of a public school in the LMA school district. This includes principals of varying employment lengths. This also included principals in charter schools. Principals who are employed in private and parochial schools in LMA included in the sampling frame because this study is focused on public schools. Additionally, principals who do not work inside the metro LMA area are also excluded from the form.

Power Analysis

I conducted a power analysis using G*Power (Erdfelder et al., 2009). G*Power is an interactive software program that performs statistical power analysis for the most common statistical test, such as t-test, F test, and χ 2 tests. For the logistic regression analysis, a power of .80 and an alpha level of .05 were used to calculate the required sample size. Using these values, the minimum sample size for the logistic regression analysis is 105 (see Figure 2). The effect size and alpha levels are the standards for computing power analysis in social scientific research (Fields, 2018; Leedy & Ormrod, 2018). A minimum sample of 105 respondents will be adequate to detect a medium-sized effect. I am using a dichotomous outcome variable. So, a binomial logistic regression was performed.

Figure 2

*Results of Power Analysis Using G*Power*



Procedures for Recruitment, Participation, and Data Collection

Principals were recruited from an LMA department of education via email. The email will contain a description of the study, the author of the study, a link to the study, and the amount of time it will take to complete the study. Once the principals click on the link, were taken to the first page of the survey, which is the informed consent form.

Informed Consent

The informed consent form contained respondents' right not to participate, and a description of confidentiality and usages of the study. If the person chooses to participate in the study, it will constitute their agreement with the content of the informed consent. To continue to the demographic survey, the respondents will have to click a button that says, "I Agree."

Data Collection and Exiting the Study

Once the respondent agreed to the terms of the informed consent form, they were taken to the first section of the questionnaire, and the respondent moved on to the 63 questions of the Schommer-Aikins (1994, 2004) Epistemological Belief Inventory. Once the 63 questions of the Epistemological Belief Inventory were completed, the respondent will be notified that they have reached the end of the survey. They will be thanked for their participation and reminded that if they have any questions, they can contact the researcher at the email address below. They will be no need for a follow-up to the study.

Archival data was used for this study, relating to school success ratings. The School Quality Rating of an LMA (Chicago Public Schools, 2017) is a performance rating of elementary and high schools in the LMA system. These are the rating scores that are publicly available and accessible of the state education web site. The original categorical scores were 1) highest performance - this is a nationally competitive school, 2) high performance – this is a good school choice with many positive qualities, 3) somewhat low performance – Additional support from the network team is needed, 4)

below average performance. The "provisional support" status requires increased support from the network, 5) lowest performance; school is in need of "intensive intervention".

Instrumentation and Operationalization of Constructs

The Schommer-Aikins (2004) Epistemological Belief Inventory will be employed to evaluate the principals' epistemological beliefs. The questionnaire consists of a 5-point Likert-type scale, where 1 = strongly disagree and 5 = strongly agree. The instrument contains 63 questions (see Appendix). The instrument focuses on four dimensions. These dimensions include the structure of knowledge, also referred to as simple knowledge; the stability of knowledge or certain knowledge; the speed of learning or quick learning; and the ability to learn, also known as fixed ability. The structure of the knowledge dimension goes from isolated bits and pieces to integrated concepts. The fifth and final dimension is source of knowledge. A question example is, "Most words have one clear meaning" (Schommer, 1990). The stability of the knowledge dimension goes from unchanging to continually changing. A question example includes, "I don't like movies that don't have an ending" (Schommer, 1990). The speed of learning dimension moves from quick, all or none, to gradual. A questionnaire sample is as follows, "Successful students learn things quickly" (Schommer, 1990). The ability to learn ranges from fixed at birth to improving with experience and over time. A sample from the questionnaire is "Self-help books are not much help" (Schommer, 1990). Exploratory factor analysis was used to generate the four hypothesized beliefs (Schommer, 1990). Research indicates that the reliability of the instrument ranges from acceptable (Knowledge Cronbach's alpha = .77, Fixed ability Cronbach's alpha = .72) to poor (Certain knowledge Cronbach's alpha = .64, Quick

learning Cronbach's alpha = .55) (Schommer-Aikins et al., 2005). However, construct validity has been confirmed with college students (Schommer, 1994), adults (Schommer, 1994), by Arredondo and Rucinski (1996), and by Garcia (2004). For the current study, mean epistemological belief scores were computed for each respondent for the omnibus analysis. Mean scores for each of the four epistemological sub-scales were also computed. Mean scores were computed for each of the four dimensions. The specific questions used to compute each of the four sub-scales are shown in Table 6.

Table 6

Epistemological Beliefs Factors and Questions

Factor Name	Questions
Factor 1 – Simple Knowledge	q15_9, q33_27, q47_41, q48_42, q50_44, q17_11, q22_16, q0023_17, q0025_19, q0028_22, q0029_23, q0036_30, q0039_33, q0063_56, q0065_58, q66_59, q0020_14, q0024_18, q0037_31, q41_35, q43_37, q44_38, q61_54, q70_63, q11_5, q35_29, q42_36, q46_40
Factor 2 – Fixed Ability	q10_4, q21_15, q31_25, q34_28, q69_62, q32_26, q38_32, q49_43, q55_49, q26_20, q30_24, q59_52, q58_51, q60_53
Factor 3 – Quick Learning	q7_1, q16_10, q45_39, q56_50, q67_60, q14_8, q53_47, q62_55, q64_57
Factor 4 – Certain Knowledge	q8_2, q18_12, q27_21, q40_34, q54_48, q68_61, q9_3, q12_6, q13_7, q19_13, q51_45, q52_46

Operationalization

The School Quality Rating Policy Overview (2019) is a performance rating of elementary and high schools in the LMA system. These rating scores are publicly available. Therefore, 1 and 2 equal pass (1), and 3, 4, and 5 equal fail (0). So, school success is scored 0 (fail) or 1 (pass).

The concept of epistemological beliefs was operationalized as the scores from the 63 questions Schommer-Aikins, (2004) Epistemological Belief Inventory. Again, the questionnaire is based on a 5-point Likert-type scale in the following order: 1 = strongly disagree to 5 = strongly agree. High scores reflect greater alignment with the specific four dimensions of epistemological beliefs, while lower scores represent less alignment with epistemological beliefs of the specific dimension. The Schommer-Aikins (2004) Epistemological Belief Inventory was an agreement scale of 1 (strongly disagree) to 5 (strongly agree). Each of the four sub-scales also used a 1-5 agreement scale.

Data Analysis Plan

I used SPSS Version 27 to analyze the data. The data analysis process took place in three phases: the data preparation phase, the preliminary analysis phase, and the primary analysis phase (see Pallant, 2020). After importing the data into SPSS v27, I examined the data set for missing data or data errors using the frequencies procedures. If errors or missing values are found and cannot be fixed by checking the original data file, then the respondents with missing questions on the Epistemological Belief Inventory will be excluded from the analysis. After the error checking is complete, mean Epistemological Belief Inventory scores will be computed for each respondent by summing all 63 questions and dividing by 63.

Once the data was checked and mean scores were computed, then the preliminary phase of the data analysis process begins. In this phase, descriptive statistics are computed for the demographic questions. Descriptive statistics for the research questions was provided with the results of the statistical analyses. Next, the parametric assumptions

of the logistic regression were conducted. The assumptions of the logistic regression analysis are linearity, no multicollinearity (Fields, 2018; Pallant, 2020; Tabachnick & Fidell, 2013). Multicollinearity is tested using the variable inflation factor (VIF) under the linear regression procedure. If the VIF value for each of the independent predictor variable is less than 10, then the assumption of multicollinearity is not violated. Linearity is reviewed by first creating a log of each continuous independent predictor variable, then including the new log variables in the regression model. If the log variables are significant, then the assumption of linearity is violated.

Finally, after the completion of the preliminary analysis, the primary analysis that addresses the research question was performed. The results of the logistic regression detailed if the independent variable (scores for five dimensions of EB) were significant predictors for the outcome variable. If significant, the logistic regressions odds ratio would reveal the strength and direction of the relationship. Finally, the model determined how much of the total variability in school success is explained by the model and epistemological beliefs.

Threats to Validity

External Validity

External validity is defined as the extent to which results can be generalized to the target population (Creswell, 2017; Leedy & Ormrod, 2018). The target population of this study was public school principals in LMUSD. A convenience sampling approach may pose a threat to external validity, as this is a non-probability sampling approach where each member of the population does not have an equal chance of being selected.

Therefore, the sample may be biased. There are approximately 111 public school principals in LMA, and the sample requirement, based on the power analysis, is 105. Therefore, the sample size may be large enough to overcome possible sample biases, given how close the sample size is to the total population of 111.

It could also be argued that a possible threat to external validity is the Schommer-Aikins Epistemological Belief Inventory (1994, 2004) which is referred to as the Epistemological Belief Inventory. There is no current research that confirms the validity instrument with non-students. The validity has been confirmed with college students (Schommer, 2004), adults (Schommer, 1998), by Arredondo and Rucinski (1998), and by Garcia (2004). Since all public-school principals and LMA are adults, this group may be covered under the current validation confirmations.

Internal Validity

Internal validity is defined as the researcher's ability to draw correct inferences from the data about the population in a study (Creswell, 2017; Leedy & Ormrod, 2018). So, threats to internal validity affect the researcher's ability to make accurate conclusions from the analysis of the data. Possible threats to internal validity in this study include regression and selection bias (Creswell, 2017; Leedy & Ormrod, 2018). Regression refers to the negative effect that extreme scores can have on the validity of statistical results. This possible threat is being addressed using boxplots to determine if there are extreme values in the data. The second possible threat is selection bias, where the respondents have certain characteristics that predispose them to have certain outcomes on the survey

instrument. Given that the target sample size (105) includes a large portion of the total sample (111), it is expected that the negative effect on statistical outcomes is minimal.

Construct Validity

Construct validity is the extent to which an instrument measures a characteristic or construct that cannot be directly observed (Creswell, 2018; Leedy & Ormrod, 2018). Face Validity and Content Validity (Trochim, 2006) are imperative for construct validity. There are minimum threats to construct validity in the primary study. The instrument captures five hypothesized beliefs, the structure of knowledge also referred to as simple knowledge; the stability of knowledge or certain knowledge; the speed of learning or quick learning; the ability to learn, and the source of knowledge. The five hypothesized beliefs were generated using exploratory factor analysis (Schommer, 1990) and mean scores from the subsets of items. Confirmatory factor analysis was performed to establish construct validity with college students (Schommer et al., 1992), adults (Schommer, 1998), by Arredondo and Rucinski (1996), and by Garcia (2004). Therefore, the threat to construct validity is minimal.

Ethical Procedures

This study was in compliance with the Walden University IRB process. Before collecting data, I obtained IRB approval (no.09-22-21-0161577). Specifically, before respondents participate in this study, they needed to read and accept the informed consent form, which acknowledged their rights as participants. Also, no personally identifiable information were obtained from respondents. So, the confidentiality of respondents was assured. Additionally, participants' information was kept anonymous. I secured the

information in my home. The data file will be kept on a secure computer that has no access to the internet for 5 years. After 5 years, the files will be securely deleted from the computer.

Summary

The purpose of this quantitative correlational design study was to determine if there is a relationship between epistemological beliefs of K-8 principals and school success as measured in LMA by the School Quality Rating Policy (SQRP) rating. This research study uses a correlation analysis to evaluate the research question. The research question for this study asks, if epistemological beliefs of K-8 principals predict school success, as measured by the Schommer-Aikins (1994, 2004) Epistemological Belief Inventory and SQRP school ratings. In this study, the target population is principals in the LMA public schools. There are a total of 111 public school principals in LMA (Chicago Department of Education, 2019). The data for this investigation exists in two forms. The first is archival data of public records of schools' yearly SQRP rating. The second will be gathered by the researcher with the Schommer-Aikins (1994, 2004) Epistemological Belief Inventory. This study will be conducted in compliance with the Walden University IRB process.

In chapter 4, the results of the study were discussed. Specifically, details of the data analysis process are provided, including the results of the data preparation phase, the preliminary analysis phase, and the primary analysis phase. The findings will reveal if the null hypothesis is rejected or not rejected.

Chapter 4: Results

Introduction

In this chapter, I examined the epistemological beliefs of K-8 principals in LMA as predictors of school success. The RQ for this study was, To what extent do epistemological beliefs of K-8 principals predict school success? The hypotheses under investigation were as follows:

$H_0$1: Epistemological beliefs of K-8 principals, as measured by the Schommer-Aikins Epistemological Belief Inventory, are not significant predictors of SQRP school ratings.

$H_1$1: Epistemological beliefs of K-8 principals, as measured by the Schommer-Aikins Epistemological Belief Inventory, are significant predictors of SQRP school ratings.

$H_0$2: Epistemological beliefs of K-8 principals, as measured by the four individual subscales of the Schommer-Aikins Epistemological Belief Inventory and number of years as principal are not significant predictors of SQRP school ratings.

$H_1$2: Epistemological beliefs of K-8 principals, as measured by the four individual subscales of the Schommer-Aikins Epistemological Belief Inventory and number of years as principal are significant predictors of SQRP school ratings.

This chapter contains the results of the analysis of the data. First, I discuss the data collection time frame and present baseline descriptive and demographic characteristics. Additionally, the representativeness of the sample is revealed. Next, the results of the analysis of the data are discussed. This includes a report of the statistical

assumptions and the statistical analysis findings. Finally, the chapter ends with a summary of key points.

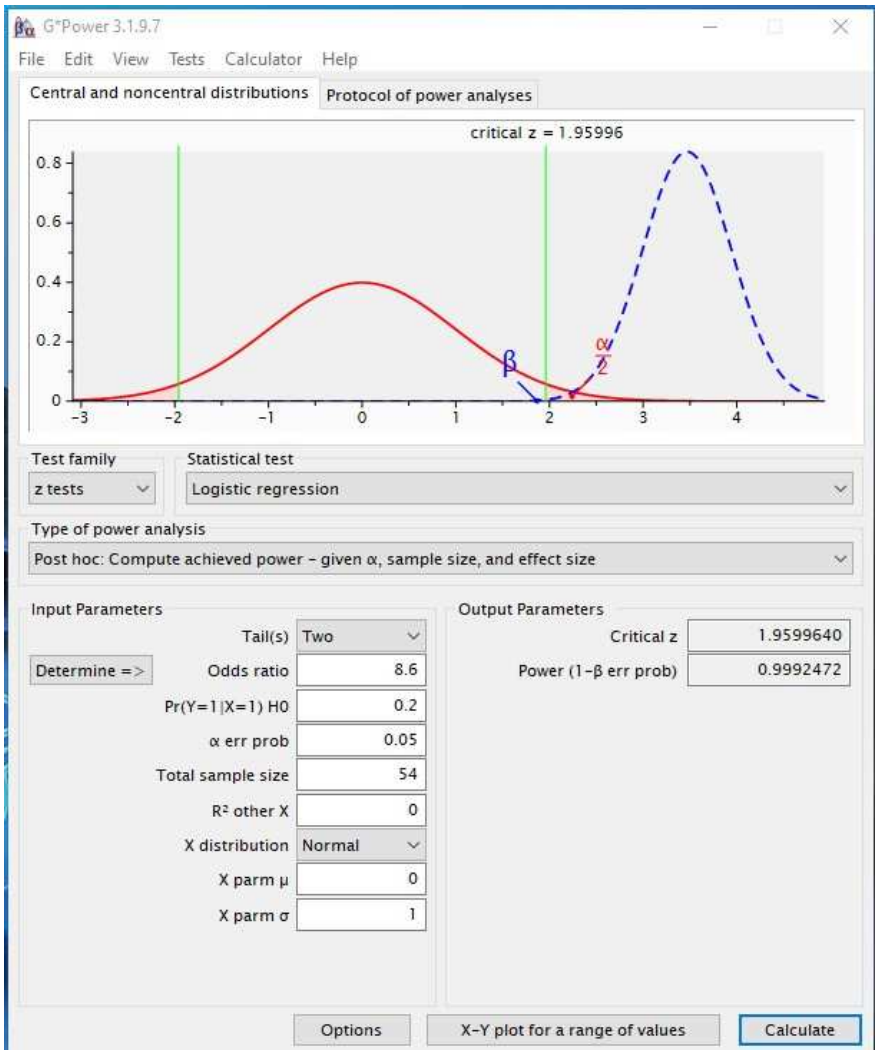
Data Collection

The data collection period occurred from November 1, 2021, to November 14, 2021. The total number of respondents completing the survey was 51. I had sought 105 respondents. However, the respondent count was 54 respondents short of the 105 target. According to district data, there were a total of 516 principals in the LMA at the time of the study. The 51 respondents represented 9.8% of the total principal population.

To evaluate the post-hoc statistical power, I conducted a power analysis using G*Power (Erdfelder et al., 2009). With an error probability of .05, an odds ratio of 8.6, one predictor variable, and a sample size of 51, the new statistical power was .99 (see Figure 3). This is above the recognized minimum standard of .80 (Field, 2018; Tabachnik & Fidell, 2018).

Figure 3

Post-Hoc Analysis for Logistic Regression



Results

Descriptive Statistics

Over 72% of respondents have worked in education for 11 or more years. All the respondents were principals of a school. Also, 84% of respondents indicated that they had

worked as principals for a period between 3 and 10 years. Most of the principal participants (88.2%) reported working in junior high school (seventh and eighth grades). Finally, over half of respondents (58.8%) headed schools that did not meet school success. Table 7 shows descriptive statistics for the categorical variables in the study.

Table 7

Descriptive Statistics of Categorical Variables

Variable	*N*	% of total
Years in education		
1-2	1	2.0
3-5	4	7.8
5-10	9	17.6
11-15	20	39.2
16 or more	17	33.3
Principal of school		
Yes	51	100
No	0	0.0
Years as principal		
1-2	6	11.8
3-5	21	41.2
5-10	22	43.1
10 or more year	2	3.9
Grades of your school		
K-3	6	11.8
4-6	4	7.8
7-8	41	80.4
School success		
Yes	21	41.2
No	30	58.8

Statistical Assumptions

There are three phases in the data analysis process: the data preparation phase, the preliminary analysis phase, and the primary analysis phase (Pallant, 2020). During data

preparation, I checked the data for errors and missing values. There were no missing values or data errors. Also, during this phase, I computed mean scores for all respondents for the questions of the epistemological survey . Mean scores for the four factors of epistemological beliefs were also computed. The four factors are simple knowledge (Factor 1), fixed ability (Factor 2), quick learning (Factor 3), and certain knowledge (Factor 4). The questions associated with each of the four factors are included in Table 8. Next was the preliminary analysis phase. During this phase, I tested the statistical assumptions. The assumption of the logistic regression with one independent variable was linearity between the independent variable and the log of the independent variable. This was evaluated by computing the log of the epistemological belief mean scores, then creating an interaction term between the log of epistemological belief and the mean scores of epistemological beliefs, and then finally regressing this on whether the school meets school success (yes or no). The results indicated that the interaction term was significant, meaning the assumption of linearity was violated ($\text{Exp}(\beta) = .00$, $p = .015$).

Table 8

Epistemological Beliefs Factors and Questions

Factor name	Question
Factor 1: Simple Knowledge	q15_9, q33_27, q47_41, q48_42, q50_44, q17_11, q22_16, q0023_17, q0025_19, q0028_22, q0029_23, q0036_30, q0039_33, q0063_56, q0065_58, q66_59, q0020_14, q0024_18, q0037_31, q41_35, q43_37, q44_38, q61_54, q70_63, q11_5, q35_29, q42_36, q46_40
Factor 2: Fixed Ability	q10_4, q21_15, q31_25, q34_28, q69_62, q32_26, q38_32, q49_43, q55_49, q26_20, q30_24, q59_52, q58_51, q60_53

Factor 3: Quick Learning	q7_1, q16_10, q45_39, q56_50, q67_60, q14_8, q53_47, q62_55, q64_57
Factor 4: Certain Knowledge	q8_2, q18_12, q27_21, q40_34, q54_48, q68_61, q9_3, q12_6, q13_7, q19_13, q51_45, q52_46

First Logistic Regression

The RQ was, To what extent do epistemological beliefs of K-8 principals predict school success? As a result of the violation in linearity, the mean composite variable of Epistemological Beliefs was divided into three equally sized categories. The mean scores for the three categories were 2.23 (SD = .05) for the low group 1, 2.67 (SD = .02) for medium group 2, and 3.07 (SD = .04) for high group 3. According to Tabachnik and Fidell (2018) and Field (2018), dividing the predictor variable into groups removes the violation of linearity. The logistic regression was conducted with the new categorical Epistemological Beliefs variable, where one was low, 2 was medium, and three was high scores. The reference group in the logistic regression was the low group. The results of the logistic regression indicated that the model was a significant predictor for school success, $\chi^2 = 8.15$, $p = .017$, where the amount of variability explained by the model ranged from 14.8% (Cox and Snell R) and 19.9% (Nagelkerke R). The coefficients table indicated that membership in the medium group (2) was a significant predictor of passing the AYP (Exp (β) = 8.56, $p = .008$). Specifically, those in the medium group were eight times more likely to achieve school success than those in the low group. The high Epistemological Beliefs group was not able to significantly predict school success,

compared to the low group (Exp (β) = 3.27, p = .214). As a result of the significant logistic regression, null hypothesis one was rejected. Tables 9. 10, and 11 show the findings for the chi-square and regression analyses.

Table 9

Chi-Square Table for the Epistemological Beliefs Categories

	Chi-square	df	P
Step	8.151	2	.017
Block	8.151	2	.017
Model	8.151	2	.017

Table 10

Regression Coefficients Table of the Log Mean Epistemological Beliefs

							95% C.I.for EXP(B)	
	B	S.E.	Wald	df	P	Exp(B)	Lower	Upper
Mean_Epist	89.743	36.801	5.947	1	.015	9.435E+38	44655958.501	1.994E+70
Log by Mean_Epist	-44.799	18.434	5.906	1	.015	.000	.000	.000
Constant	-121.647	49.722	5.986	1	.014	.000		

Table 11

Regression Coefficients Table for the Epistemological Beliefs Categories

							95% C.I.for EXP(B)	
	B	S.E.	Wald	df	p	Exp(B)	Lower	Upper
Epist_Group			6.998	2	.030			
Epist_Group (1)	2.147	.814	6.957	1	.008	8.556	1.736	42.169
Epist_Group (2)	1.184	.805	2.164	1	.141	3.267	.675	15.816
Constant	-1.540	.636	5.863	1	.015	.214		

a. Variable(s) entered on step 1: Epist_Group.

To evaluate if the four factors and number of years as a Principal are significant predictors of school success, a logistic regression was conducted. The test of assumptions indicated that factor 1 violated the assumption of linearity. So, factor 1 was divided in to three equally sized groups, low (1 to 2.37), medium (2.38 to 2.75), and high (2.75 and above). Table 12 shows the results of the test of linearity.

Table 12

Regression Coefficients Table of the Log Mean Epistemological Beliefs Factors

							95% C.I.for EXP(B)	
	B	S.E.	Wald	df	p	Exp(B)	Lower	Upper
Factor_1	168.45	59.66	7.97	1	.01	1.436E+73	2366903056877 8900000000	8.709E+123
Factor_2	-6.97	29.96	.05	1	.82	.00	.000	2982616151408552 5000000
Factor_3	-29.87	20.66	2.09	1	.15	.00	.000	40534.699
Factor_4	-5.22	31.23	.03	1	.87	.01	.000	2086649891126518 600000000
Factor_1 by Ln_Factor1	-85.51	30.19	8.02	1	.01	.00	.000	.000
Factor_2 by Ln_Factor2	3.26	14.10	.05	1	.82	25.98	.000	26035560843339
Factor_3 by Ln_Factor3	14.54	10.23	2.02	1	.16	2053320	.004	1041448830179612
Factor_4 by Ln_Factor4	3.34	16.30	.04	1	.84	28.08	.000	2115660367023608
Constant	-167.77	59.10	8.06	1	.01	.000		

Second Logistic Regression

The second logistic regression included the four factors, and another predictor variable, the number of years respondents have served as Principal. The outcome variable, as in the first logistic regression, was school success. The results indicated that the model was not a significant predictor of school success, χ^2 (5) =2.22, p = 8.18, where the R^2 was.043 (Cox and Snell) and .057 (Nagelkerke). Meaning, none of the predictor variables were a significant predictor of school success. Based on the results of the logistic regression (see Tables 13 and 14), null hypothesis two was not rejected.

Table 13

Chi-Square Table for the Epistemological Beliefs Factors

	Chi-square	Df	P
Step	2.221	5	.818
Block	2.221	5	.818
Model	2.221	5	.818

Table 14

Regression Coefficients Table for the Epistemological Beliefs Factors

							95% C.I.for EXP(B)	
	B	S.E.	Wald	df	p	Exp(B)	Lower	Upper
Factor_2	.114	.902	.016	1	.900	1.121	.191	6.565
Factor_3	-.328	.870	.142	1	.706	.720	.131	3.964
Factor_4	.170	.945	.032	1	.857	1.185	.186	7.556
Factor1_Group	.505	.513	.968	1	.325	1.657	.606	4.527
Years as principal	.074	.371	.040	1	.841	1.077	.521	2.227
Constant	-1.568	2.409	.424	1	.515	.208		

Post Hoc Test

The logistic regression does not have a post-hoc test. Additionally, no follow-up tests were necessary, based on the logistic regression findings. Therefore, there was no post-hoc test for this study.

Summary

For this study, the research question was, to what extent does epistemological beliefs of K-8 principals predict school success. The null hypothesis under investigation was epistemological beliefs of K-8 principals, as measured by the Schommer-Aikins

Epistemological Belief Inventory is not a significant predictor of SQRP school ratings. Logistic regressions were conducted to determine if Epistemological Beliefs was a significant predictor of school success. For the first logistic regression, there were three Epistemological Beliefs categories, based on low medium and high scores. The means scores for each of the group were 2.23 (SD = .05) for the low group 1, 2.67 (SD = .02) for medium group 2, and 3.07 (SD = .04) for high group 3. The results of the logistic regression indicated that the model was a significant predictor of school success. The amount of variability explained by the model ranged from 14.8% (Cox and Snell R) and 19.9% (Nagelkerke R). The high Epistemological Beliefs group was not able to significantly predict school success, compared to the low group. The medium group (2) was a significant predictor of school success. Specifically, those in the medium group were eight times more likely to achieve school success than those in the low group. As a result of the significant logistic regression, the first null hypothesis was rejected. However, when the four factors of Epistemological Beliefs were examined as predictors of school success, the four factors and time as Principal were not significant. Therefore, I failed to reject the second null hypothesis. It is suspected that dividing epistemological beliefs into three groups in the first regression made it more different in nature than the four categories of epistemological beliefs.

In chapter 5, the results are reviewed in the context of the literature review. Specifically, the results will be examined to determine if the outcome of the study was aligned with what was expected from research that was reviewed in chapter two. Chapter five discusses the limitations of the study and the recommendations for future research.

Chapter 5: Discussion, Conclusions, and Recommendations

Introduction

The purpose of this quantitative correlational study was to examine to what extent epistemological beliefs of K-8 principals in LMA predicted school success. I used logistic regression analysis. The first continuous predictor variable was epistemological beliefs as measured by the Schommer–Aikins (2004) Epistemological Belief Inventory. The second variable was a dichotomous dependent variable that measured school success. This variable was determined by whether or not the school achieved school success. This was scored as 0 (unsuccessful) or 1 (successful). In the LMA, there were approximately 516 principals at the time of the study. As discussed in Chapter 3, a minimum sample of 105 principals was required. Only 10.4% of the total population of principals responded to the survey, A non probalisticconverience sample was used. Specifically, invitation flyers were placed within principals' Facebook groups. The invitation contained the survey topic and a brief description.

I conducted two logistic regression analysis. Based on the results of the first analysis, the null hypothesis that epistemological beliefs were not a significant predictor of school success was not rejected. However, when the second logistic regression analysis was conducted, the four factors of epistemological beliefs and time as principal, the results were not significant. The first regression analysis conducted included epistemological beliefs categories based on three groups: low, median and high. In the high group, epistemological beliefs were not able to predict school success. However, in the median group principals who held certain epistemological beliefs were more likely to

pass AYP and therefore predict school success. Furthermore, the medium group was 8 times more likely to achieve school success than the low group. The second logistic regression test included the four factors for achieving school success (simple knowledge, fixed knowledge, quick learning, and certain knowledge) as well as time as principal. It failed to reject the null hypotheses. Thus, the null hypotheses were not rejected.

Interpretation of the Findings

I discuss the findings in relation to the literature and theoretical framework. The RQ that I sought to the answer was, To what extent do epistemological beliefs of K-8 principals predict school success?

Findings in Relation to the Literature

I found that being in the medium group in regard to epistemological beliefs was a predictor of school success. A logistic regression was conducted to determine if epistemological beliefs predict school success. To avoid issues associated with the threat of linearity, the mean composite variable was divided into three equally sized groups: low (scores), middle (average range), and high (scores). The low group was the reference group. The low group was coded as 1, the middle group as 2, and the high as 3. Thus, those principals who scored in the middle were more likely to predict school success. In fact, those principals with middle scores were 8 times more likely to predict school success. The high and low groups were not able to predict school success. Thus, those principals with average scores (middle group) were 8 times more likely to meet school success goals.

Epistemological beliefs are predictive of school success, research shows. Schechter (2017) found that principals are mediators of reform. Although Schechter's study was conducted outside of the United States, the idea that principals' decisions are central to school success is supported by the seminal theorists discussed in the literature review. Arredondo (1998), Varaki (2003), and Seals (2011) all generally concluded that principal epistemological beliefs influence decisions within the school. Seals concluded that the epistemological beliefs of principals influenced curriculum decisions. Arrredondo et al., Varaki, and Seales are the only researchers I have found who have examined the epistemological beliefs of principals and how they affected principal decisions.

Buske and Zlatkin-Troitschanskaia (2019) found that principals who held naive beliefs were less inclined to use external data in their decisions. This study shows that epistemological beliefs inform principal decisions within schools. Thus, as mediators of reform, this makes principal beliefs a very critical factor in school success. The literature review shows how epistemological beliefs affect teacher and student achievement. Winberg et al. (2018) showed that epistemological beliefs affect student achievement.

Markauskaite and Goodyear (2017) found that epistemological beliefs influence problem solving, learning tasks, and judgment. This study further shows that epistemological beliefs affect decisions and how decisions are processed. Lesoto et al. (2017) also found that epistemological beliefs affected student achievement. Using Perry's (1999) scale, Saleem et al. (2017) also found that epistemological beliefs correlated to age, wisdom, gender, and education. These findings support that epistemological beliefs affect achievement behavior.

More specifically, these studies show that epistemological beliefs affect student achievement and teacher success. These beliefs also influence how principals use data in their decisions. This study further substantiates that epistemological beliefs affect principal decisions. However, previous researchers did not indicate whether the principal was in a K-8 school or high school. Thus, this study differs in its scope.

I rejected the null hypothesis because the medium group was found to be 8 times more likely to achieve school success. Thus K-8 principals within the medium group were found to be more likely to achieve school success. This supports foundational premises of epistemological belief studies. Perry (1999) viewed epistemological belief studies as a cross-discipline study that concerned the nature of knowledge and the process of knowing. Epistemological belief studies focus on all levels of education. Perry began in the 1950s studying the connection between academic achievement and epistemological beliefs of college students. Subsequent researchers extended epistemological belief studies to all levels of study. Schommer-Aikins (2004) explored middle and high schools. In addition, Schommer-Aikins developed the Epistemological Belief Inventory to show that epistemological beliefs can be studied quantitatively. Hofer (2010) focused on methodological issues.

Findings in Relation to the Theoretical Framework

For the theoretical framework of this study, I included general theorists who developed fundamental theories and seminal theorists who extended the general theories. Perry (1999), Hofer (2002), and Schommer-Aikins, (2004) are the general theorists who developed the field. In this study, Perry and Schommer-Aikins were particularly

important. Perry contended that students develop epistemological beliefs over time and that epistemological beliefs are developed in stages of dualism, multiplicity, relativism, and commitment. Schommer-Aikins asserted that Perry's epistemological model could be quantitatively measured. Schommer-Aikins developed the Epistemological Belief Inventory to measure epistemological beliefs. Schommer-Aikins developed a five-factor model of epistemological beliefs. In the five-factor model, epistemological beliefs are centered around the source of knowledge, the certainty of knowledge, omniscience of knowledge, controllability of knowledge, and the speed of knowledge. Schommer-Aikins introduced a 63 Epistemological Belief Inventory that measured each factor. Schommer-Aikins found through more than 15 studies that epistemological beliefs influenced student achievement in elementary, high school, and college. In addition, Schommer-Aikins showed that epistemological beliefs also affect teacher success within the classroom. Arredondo and Rucinski (1998) found that there was no difference between epistemic beliefs of teachers and principals. Therefore, principals' epistemic beliefs affect school success just as much as teachers'.

Arredondo and Rucinski (1998) Varaki (2003), and Seales (1011) extended epistemological research to principals' decision-making within the school. However, Arredondo and Rucinski, Varaki, and Seales have been the only major studies that focused on the role that epistemological beliefs play in decision-making. Arredondo and Rucinski and Varaki showed how epistemological beliefs influence data administrators. Curriculum decisions are made within the school and how innovations are adopted within

the school by administrators. Seales focused on epistemological beliefs of principals and how they enact those beliefs within their schools.

The theoretical framework showed that epistemological beliefs are measurable and that epistemological beliefs influence principals' school-wide decisions, specifically how data is used or not used within the school and how curriculum decisions are made. This study is confluent with the theoretical framework because it shows that the epistemological beliefs of principals as measured by the Schommer-Aikins (2004) predict school success. Teachers' epistemological beliefs affect school success and principals, Arredondo and Rucinski (1998). This study found that out of three groups (high, middle, and low), the principals that scored average were 8 times more likely to predict school success. This is consistent with the findings within the theoretical framework, which found that epistemological beliefs are measurable and that they impact how data is used by administrators, how curriculum decisions are made by administrators, and how innovations are implemented within the school. This study further extends the goal of epistemological studies by limiting the scope to elementary schools and how epistemological beliefs predict school success. According to Schechter (2017), principals are the mediators of reform. This means that reform measures will fail if school administrators do not understand enough about how principals make decisions and what factors influence those decisions. Epistemological beliefs are largely unseen and unnoticed. In order to understand their influence, research must be conducted. This study is an extension of the theoretical framework that seeks to understand the relationship between epistemological beliefs and academic beliefs on all le3vels. Many studies

focused on understanding the role of epistemological beliefs in the academic achievement of students (college to middle and elementary school), teachers, and with this study, Principals on the elementary school level.

Limitations of the Study

This study used a quantitative correlational study to predict whether epistemological beliefs of k-8 principals predict school success in elementary school in a Large Metropolitan Area. Specifically, this study used logistic regression to evaluate the question. The independent predictor variable was Epistemological beliefs as measured by Schommer-Aikins (2004) Epistemological scale. The dichotomous dependent variable was school success as determined through SQRP. According to the CPS (2021), there were approximately 516 principals in the LMA. Based on the G*Power analysis, this study sought to obtain 105 respondents. However, this study received 51 respondents. This represented 10.4% of the total LMA. The low sample size is an external threat to validity. The data collection time was approximately 2 weeks. Perhaps the survey period needs to be extended in future studies.

The limitation to the internal validity was that the respondents self-reported their school success status via the SQRP. There was no external data collected from survey respondents that validated whether their school met school success status or did not make school success. In addition to this, the length of time to complete the survey was 20 minutes. The survey length was 74 questions. Future studies could address this issue by shortening the time it takes to complete the survey. Therefore, there may be questions

about how the time to complete the survey may have affected the total number of respondents.

Recommendations

This study showed that epistemological beliefs of principals affect decisions about curriculum as well as how data is used to make decisions (Arredondo & Rucinski, 1998; Seales, 2011; Varaki, 2003). Principal decisions matter. This idea is further supported by Schechter (2017) who found that principals are mediating agents of reform. Thus, principals are central to school reform.

Breger (2017) found that schools' achievement within the CPS is correlated with poverty/ Also, family income is correlated with urban education. Thus, school achievement is linked to poverty and family income. This study connects epistemological beliefs of principals to school achievement. How a non-achieving school affects families in an area could be looked at as an external output- poverty and income. However, epistemological beliefs of principals as decision-makers or mediating agents of reform could be envisioned as an input. Thus, school reform can also be addressed by the principal selection process. Epistemological beliefs of principals are a factor in school improvement that should be addressed. This study found that the medium group average scores was 8 times more likely to predict school success. Thus, school districts seeking to hire effective principals could use epistemological score data – if the principal candidate scores a middle score- to determine if a principal candidate will be an effective principal. This could promote social change. Therefore, making schools effective has many positive effects on the individual stakeholders and the community stakeholders.

The principal selection process in many school districts is already complex. However, because many consider principals to be the gatekeepers of change, how principals make decisions is important. There needs to be further research on the details of how epistemological beliefs of principals predict school success on a larger scale. Principals need awareness of how their prior beliefs on specific topics in areas of epistemological beliefs affect how they view topics and how those views influence their decisions. In many cases, awareness can be a cure. However, the recommendation is that more knowledge needs to be done in this area. That research should help inform districts on how principals are educated and selected in the future.

This study calls for additional further research to understand the precise relationship between epistemological beliefs of principals and school success. This study was a correlational study to determine if epistemological beliefs of K-8 principals predict school success. This study found a connection to school success and epistemological beliefs within the medium group. However, the study did not find that the four factors of epistemological beliefs plus time as principal were significant. Further research needs to be done that clarifies how that relationship works. Research in this area may have a significant impact on school reform because principals are mediators of reform. They are empowered by school boards to enact change within their school.

This recommendation calls for a similar study on a larger scale. This study used convenience sampling. However, in the future, the study could be carried out within three large metropolitan areas: New York, Chicago, and Los Angeles. Why these areas? They are the largest metropolitan urban centers, and any significant result within these areas

would show that epistemological beliefs can have a national impact on principal decisions. A future study would not be done using convenient sampling but would be sanctioned by the urban school districts. Furthermore, any significant results from a study in large urban areas could have policy significance as well as educational import and warrant further studies in the area of how epistemological beliefs [predict school success.Finally further studies need to be done focusing on charter schools and schools in smaller districts. Additionally district and school culture need to be considered.

Implications

The purpose of this quantitative correlational study was to examine to what extent epistemological beliefs of K-8 principals in LMA predicted school success. The results of the first logistic regression test showed that out of three groups, the medium group was 8 times more likely to predict school success; there is a need for more studies to illuminate this relationship. Even though the results of this particular study ended with a rejection of the null hypothesis, the sample size was smaller than desired, resulting in low statistical power. The second logistic regression examined the four factors of epistemological beliefs individually and the results showed that the factors were not significant predictors of school success. Thus, this study failed to reject the second null hypothesis. Thus, a larger study with a larger sample with the same methodology is proposed. In addition, this study can have a positive impact on students' success, school success, and perhaps community improvement. The effect of the social impact has a lot to do with a more precise understanding of the relationship between epistemological beliefs and school success. However, it has been shown that epistemological beliefs affect student

achievement, teaching success, and how principals make use of data within their schools. It has also been shown that principals are the gatekeepers of school success, improving how principals make decisions within schools has an enormous influence on the direction a school can take. Further studies need to be done to further illuminate the relationship between epistemological beliefs and school success.

Furthermore, principals who understand how their epistemological beliefs affect their decisions on how to use data within their schools may make more informed decisions. This can have an impact on a larger scale principal by principal, school by school. Social change can start from a macro level, or it can be engendered from the micro level. This means that it can start from a national policy level, I.E. NCLB 2001 or it can begin from a school-wide level of improvement. Social change from a micro-level would involve in the area of epistemological beliefs, helping principals to be aware of how their epistemological beliefs can be predictive of school success as well as helping them to understand their beliefs and how those beliefs can help them improve their decisions within schools.

Conclusion

The purpose of this quantitative correlational study was to examine to what extent epistemological beliefs of K-8 principals in LMA predicted school success. However, there need to be further studies with a larger sample size to determine the nature of that relationship. This study is important because principals m in the era of school reform have been identified as the gatekeepers of school reform. All school reform ultimately runs through a principal. This fact makes the role, decisions, and behavior of principals as

very critical to school success. School success on the elementary and high school level has been shown to lead to success in college. In other words, the success of schools has an effect on the overall life of the students. Students who are able to achieve in school have a better chance at fulfilling their life goals. This makes the roles that principals play in the school as very important. Thus, this study's goal was to further understand the role through investigating principals' epistemological beliefs. School success has a trickle-down effect on the life of the students. There is a significant social impact by understanding this relationship because understanding how to improve any relationship that predicts school success will have a positive social impact. In other words, this can have a multiplier effect on schools. Understanding the conditions that further predict school success will have a trickledown effect on students' success and therefore have a great impact on society. School reform was a social good promoted by NCLB 2001 and then ESSA 2014. School improvement is a social good, and understanding the role that epistemological beliefs play in predicting school success will can bring about a positive social change on a large scale.

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Appendix: Epistemological Beliefs of K-8 Principals Questionnaire

Demographic Questions

1. How many years have you worked in the education field?

    Less than 1 year, 1-2 years, 3-5 years, 5-10 years, 11-15 years, 16 or more years

2. Are you currently a principal of a school?

    1) Yes, 2) No (**TERM**)

3. How many years have you been a principal?

    Less than 2 years (**TERM**), 1-2 years, 3-5 years, 5-10 years, 11-15 years, 16 or more years

4. What grades does your school have?

    Select all that apply. 1) K-3, 2) 4-6, 3) 7-8, 4) high school (**TERM**)

5. Is your school in the Chicago Area?

    1) Yes, 2) No (**TERM**)

6. Did your school meet AYP within the last year?

    1) Yes 2) No

Epistemological Beliefs Questionnaire

Directions: There are no right or wrong answers for the following items. We only want to know what you really believe. For each statement, indicate the degree to which you agree or disagree.

1 = Strongly Disagree, 2 = Disagree, 3 = No Opinion, 4 = Agree, 5 = Strongly Agree

1. If you are ever going to be able to understand something, it will make sense to you the first time you hear it.
2. The only thing that is certain is uncertainty itself.
3. For success in school, it's best not to ask too many questions.
4. A course in study skills would probably be valuable.
5. How much a person gets out of school mostly depends on the quality of the teacher.
6. You can believe almost everything you read.
7. I often wonder how much my school leaders really know.
8. The ability to learn is innate.
9. It is annoying to listen to a speaker who cannot seem to make up his/her mind as to what he/she really believes.
10. Successful students understand things quickly.
11. A good teacher's job is to keep his/her students from wandering from the right track.
12. If scientists try hard enough, they can find the truth to almost anything.
13. People who challenge authority are overconfident.
14. I try my best to combine information from several sources or even across classes.
15. The most successful people have discovered how to improve their ability to learn.
16. Things are simpler than most professors would have you believe.
17. The most important aspects of scientific work are precise measurement and careful work.
18. To me, studying means getting the big ideas from the text rather than details.

19. Educators should know by now which is the best method, lecture or small group discussions.
20. Going over and over a difficult textbook chapter usually won't help you understand it.
21. Scientists can ultimately get to the truth.
22. You never know what a book means unless you know the intent of the author.
23. The most important part of scientific work is original thinking.
24. If I find the time to reread a textbook chapter, I get a lot more out of it the second time.
25. Students have a lot of control over how much they can get out of a textbook.
26. Genius is 10% ability and 90% hard work.
27. I find it refreshing to think about issues that authorities can't agree on.
28. Everyone needs to learn how to learn.
29. When you first encounter a difficult concept in a textbook, it's best to work it out on your own.
30. A sentence has little meaning unless you know the situation in which it is spoken.
31. Being a good student generally involves memorizing facts.
32. Wisdom is not knowing the answers but knowing how to find the answers.
33. Most words have one clear meaning.
34. Truth is unchanging.
35. If a person forgot details, and yet was able to come up with new ideas from a text, I would think they were bright.

36. Whenever I encounter(ed) a difficult problem in teaching, I consult(ed) with my principal or department chair.
37. Learning definitions word for word is often necessary to do well on tests.
38. When I study, I look for specific facts.
39. If a person can't understand something within a short amount of time, he/she should keep on trying.
40. Sometimes you just have to accept answers from a teacher even though you don't understand them.
41. If teachers would stick more to the facts and do less theorizing, students could get more out of school.
42. I don't like movies that don't have an ending.
43. Getting ahead takes a lot of work.
44. It's a waste of time to work on problems which have no possibility of coming out with a clear-cut and unambiguous answer.
45. Students should evaluate the accuracy of information in a textbook, if they are familiar with the topic.
46. Often, even advice from experts should be questioned.
47. Some people are born good learners, others are just stuck with limited ability.
48. Nothing is certain but death and taxes.
49. The really smart students don't have to work hard to do well in school.
50. Working hard on a difficult problem for an extended period of time only pays off for really smart students.

51. If a person tries too hard to understand a problem, he/she will most likely just end up being confused.
52. Almost all the information you can learn from a textbook you will get during the first reading.
53. Usually you can figure out difficult concepts if you eliminate all outside distractions and really concentrate.
54. A really good way to understand a textbook is to reorganize the information according to your own personal scheme.
55. Students who are "average" in school will remain "average" for the rest of their lives.
56. A tidy mind is an empty mind.
57. An expert is someone who has a special gift in some area.
58. I really appreciate instructors who organize their lectures meticulously and then stick to their plan.
59. The best thing about science courses is that most problems have only one right answer.
60. Learning is a slow process of building up knowledge.
61. Today's facts may be tomorrow's fiction.
62. Self-help books are not much help.
63. You will just get confused if you try to integrate new ideas in a textbook with knowledge you already have about a topic.

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Marlo S-A <marloschommeraikins@gmail.com>

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Dear Leland Sanford,

You have my approval to use my survey. You may need to modify it in order to make it appropriate for your sample. I have attached a document with the survey and a few articles that you may find of interest.

Sincerely,

Marlene Schommer-Aikins, PhD

Professor Emerita of Educational Psychology