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A case study on the perceived impact of elementary school departmentalization on teacher math self-efficacy

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A CASE STUDY ON THE PERCIEVED IMPACT OF ELEMENTARY SCHOOL
DEPARTMENTALIZATION ON TEACHER MATH SELF-EFFICACY

By

Richard Haley III

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DEPARTMENTALIZATION ON TEACHER MATH SELF-EFFICACY

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A Case Study on the Perceived Impact of Elementary School Departmentalization on Teacher Math Self-Efficacy

Abstract

By Richard Haley

University of the Pacific
2018

This dissertation is a qualitative case study of three elementary teachers that currently teach at a school implementing a departmental structure in Northern California. Data was gathered by interviewing each participant individually and is presented in the form of a narrative for each participant. The purpose of this study was to explore the math self-efficacy of elementary teachers who teach in a school implementing a departmental structure. The research addressed the following question: How does a departmental structure influence the experiences, perceptions, and self-efficacy of elementary teachers as each relates to mathematics instruction? The results of this study demonstrate that, when implemented correctly, respecting teacher autonomy and choice, a departmental structure at the elementary level can provide a framework that has a positive impact on teacher professional math self-efficacy. The structure creates the opportunity for focused preparation and learning, teacher specialization based on subject strength, and perceptions that the teachers are respected and trusted as content and instructional experts. All three participants expressed that they feel they are better math teachers in the departmental structure than they were in the single classroom structure. They also each expressed that they experience greater job satisfaction and reduced stress in the departmental structure.

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Chapter 1: Introduction

Teacher efficacy has been identified as a key variable that has a significant impact on the learning of students (Chang, 2015). Teacher efficacy is directly tied to subject self-efficacy as teachers that are confident in the content area they are teaching are more likely to ask deep questions, take appropriate risks, and make key conceptual connections in student learning and understanding (Gresham, 2009; Strohl, Schmertzing, & Schmertzing, 2014). It is therefore critical that teachers are teaching content that they identify as areas of strength, yet the majority of elementary teachers teaching math in the United States currently feel inadequate to do so (Gresham, 2009; Jackson, 2008; Miller, 2010). These teachers report to have low self-efficacy related to mathematics instruction and often experience math anxiety that leads to poor instructional practice and avoidance (Blazer, 2011; Gresham, 2009; Jackson, 2008; Zaya, Kwalat, & Attach, 2016). This reality has a direct negative impact on student learning, understanding, and disposition towards mathematics (Chang, 2015; Strohl, Schmertzing, & Schmertzing, 2014; Taylor & Fraser, 2008).

In response, a growing number of elementary schools across the nation are shifting from the traditional single classroom model to various forms of subject specific departmentalization (Hood, 2010). The single classroom model consists of one teacher teaching the same students for the majority of the school day and this teacher is responsible for teaching all four of the primary academic subjects. In a departmental structure, teachers are commissioned to teach only one or two of the core subjects and teach two or more student groups each school day (Hood, 2010; Lui, 2011). In this study, I examined the lived experiences of three teachers as they relate to math instruction in a departmental structure and I composed a narrative for each. The narratives of these teachers provide insight into the math related experiences and perceptions of

teachers in a departmental structure and can be analyzed for the purpose of identifying and understanding the impact of school structure on teacher self-efficacy and perception.

The purpose of this introductory chapter is to present an overview of the study. I first provide a brief background of math instruction as it relates to elementary school structure and teacher self-efficacy in the United States. I then present the research problem, research questions, purpose of the study, and significance of this study. All of these drive the design of the study which is described toward the end of this chapter.

Background

Math achievement among students in the United States falls below many East Asian and Scandinavian countries (Lui, 2011; Stigler & Heibert, 1997). Although there are a multitude of factors that impact student learning and achievement, one factor that has been demonstrated to greatly contribute to variance is teacher efficacy (Chang, 2015). Therefore, students taught by highly efficacious mathematics teachers have the greatest likelihood of high mathematical achievement (Burns, 2014; Leinwand & Fleischman, 2004; Strohl, Schmertzing, & Schmertzing, 2014). Math content expertise directly impacts instructional capacity (Leinwand & Fleischman, 2004). In the United States, the vast majority of elementary teachers teaching mathematics lack this critical math expertise as they are either generalists or specialize in subjects related to literacy (Burch & Spillane, 2003; Miller, 2010). This reality exists because approximately 80 percent of elementary schools (grades kindergarten through six) utilize a traditional single classroom model (Miller, 2010).

In the single classroom structure, elementary teachers are expected to teach four unique subjects: English, science, history, and mathematics. Proponents of this model point out that a single classroom environment allows for teachers to build deep relationships with students and

develop connections across content areas, both of which are critical to early academic development (Gutek, n.d.; Hood, 2010). Advocates of an alternative structure argue that while these benefits are valuable, the costs associated with the lack of mathematical expertise in elementary school is too great to tolerate (Hood, 2010). Over 50 percent of elementary teachers experience math anxiety stemming from low math self-efficacy and in some studies the figures reach the low 80th percentile (Bursal & Paznokas, 2006; Gresham, 2009; Jackson, 2008). Opponents of the traditional single classroom model assert that, because the majority of elementary teachers report to experience feelings of math inadequacy and math anxiety, they often practice math avoidance, and the learning of elementary students in mathematics is negatively impacted (Blazer, 2011; Gresham, 2009; Jackson, 2008; Zaya, Kwalat, & Attach, 2016). In order to teach mathematics well, teachers must be comfortable and capable of exploring multiple solution pathways, linking mathematical content domains, asking questions that promote introspection and growth, and facilitating learning experiences that guide students toward deep conceptual discovery and understanding (Ball & Bass, 2000; Black & Wiliam, 1998; Leinwand & Fleischman, 2004; Wiliam, 2011). However, due to the lack of mathematical expertise and math self-efficacy of teachers in elementary classrooms (Gresham, 2009), the majority of instruction that takes place is procedural and detached from conceptual understanding (Burch & Spillane, 2003; Burns, 2014). In order to address this issue, a growing number of elementary schools across the United States have begun to implement structures utilizing departmentalization in hopes of increasing teacher subject expertise and ultimately, student achievement (Miller, 2010). From 1995 to 2010, the number of elementary schools utilizing a departmental structure in the United States increased from approximately 5 percent to almost 20 percent (Miller, 2010). There is research demonstrating that narrowing the scope of

subject matter taught by a teacher increases self-efficacy (Strohl, Schmertzing, & Schmertzing, 2014), however, further research is required to explicitly explore the impact of departmentalization on elementary teacher math self-efficacy and math anxiety.

Departmentalization is a structure that has long been the norm at the secondary level where all subjects are taught individually by teachers with content specific expertise (Lui, 2011). At the elementary level, departmentalization exists when teachers are commissioned to teach only one or two of the four primary subjects (Lui, 2011; Miller, 2010). This structure can take on many forms, but regardless of the specifics, this model provides the opportunity to significantly increase the overall self-efficacy and therefore instructional efficacy of the classroom teacher. In a departmental structure, teachers are able to focus on only one or two subjects and are able to specialize in content areas of strength (Chan & Jarman, 2004; Lui, 2011). They are able to narrow their focus when planning and collaborating. This allows the teachers to explore content more deeply and plan instruction that is more effective (Ball & Lacey, 1984; Lui, 2011). Not only is focused collaborative planning more effective, it can also decrease workload and reduce teacher burnout (Strohl, Schmertzing, & Schmertzing, 2014). Finally, departmentalization provides the opportunity for more frequent content specific professional development. Professional learning that is focused and relevant to classroom practice is shown to increase teacher efficacy and self-efficacy (Chang, 2015; Strohl, Schmertzing, & Schmertzing, 2014; Wayne, Yoon, Zhu, Cronen, & Garet, 2008).

Increased content expertise, focused professional development, reduced stress, and productive collaboration all contribute to greater teacher self-efficacy. This is significant because teachers with high self-efficacy are more likely to engage in instructional practices that positively impact student academic achievement (Bandura, 1993; Chang, 2015; Gresham, 2009;

NURLU, 2015; Strohl, Schmertzing, & Schmertzing, 2014; Zaya, Kwalat, & Attach, 2016).

These teachers take more instructional risks, set high expectations, dive deep into conceptual exploration, and establish meaningful and impactful relationships with students (Gresham, 2009; NURLU, 2015; Strohl, Schmertzing, & Schmertzing, 2014; Zaya, Kwalat, & Attach, 2016).

Ultimately, increased teacher self-efficacy leads to improved learning experiences in the classroom which translate to higher levels of student achievement and understanding (Bandura, 1993; Chang, 2015; Gresham, 2009; NURLU, 2015; Strohl, Schmertzing, & Schmertzing, 2014; Zaya, Kwalat, & Attach, 2016).

Research Problem

There is a significant amount of research related to the importance of expertise and self-efficacy of teachers as it pertains to the learning and achievement of students in mathematics. There is also a wide range of research that explores the experiences of teachers and how those experiences impact perception, self-efficacy, instruction, and more. There is even research indicating that narrowing the scope of subject content taught has a positive impact on teacher attitude and self-efficacy (Strohl, Schmertzing, & Schmertzing, 2014). And although departmentalization inherently reduces the breadth of content taught by each teacher, there is no research that explicitly explores an existing example of elementary departmentalization and the impact this model has on teacher math self-efficacy. There is a need for research that aims to comparatively analyze the experiences and math self-efficacy of teachers in a departmental structure with that which is already known about teacher math self-efficacy in a single classroom model. It is this research that will inform school structures, professional development, teacher preparation programs, support practices, hiring practices, and more in elementary education in the United States.

Conceptual Framework

This qualitative study utilizes an interpretive framework. Interpretive research rejects the idea that there is one single definable reality (Merriam, 2009) and “assumes that reality is socially constructed” (Merriam, 2009, p.8). The reality for each individual is developed based on lived experiences and how that particular person makes meaning of the experiences they encounter (Merriam, 2009; Rubin & Rubin, 2005). Constructed individual reality is the result of a composition of perceptions and sense making (Merriam, 2009; Rubin & Rubin, 2005). Because of this, the interpretive researcher acknowledges that for different individuals, it is possible that two entirely different realities can simultaneously exist and both are valid (Rubin & Rubin, 2005). In this study, I examined the lived experiences related to math instruction of elementary teachers in a departmental structure, and explored how this school structure impacts the perceptions and constructed realities of each participant.

Purpose Statement and Research Question

The purpose of this study was to explore the math self-efficacy of elementary teachers who teach in a school implementing a departmental structure. This research addressed the following question: How does a departmental structure influence the experiences, perceptions, and self-efficacy of elementary teachers as each relates to mathematics instruction?

Significance of the Study

As stated above, students in the United States are consistently being outperformed by nations throughout the world (Chang, 2015). Therefore, a reexamination of existing educational structures is necessary. It is critical that this is done at the elementary level to ensure that students are exposed to high quality conceptual mathematics instruction and are able to develop a mathematical foundation that is as strong as possible (Ball & Bass, 2000; Leinwand &

Fleischman, 2004). This study explored the teacher math self-efficacy of elementary teachers in a school utilizing a departmental model. This is significant because one factor known to directly impact math instruction and student achievement is teacher math self-efficacy (Akay & Boz, 2010; Chang 2015; Gresham, 2009; Zaya, Kwalat, & Attach, 2016). Teacher math self-efficacy directly impacts teacher self-expectations, expectations for student learning, instructional perseverance, and willingness to take appropriate risks in order to optimize mathematical conceptual understanding and problem solving ability (Akay & Boz, 2010; Bandura, 1993; Gresham, 2009; Zaya, Kwalat, & Attach, 2016). Teacher math self-efficacy directly impacts both student math self-efficacy and mathematical academic achievement (Akay & Boz, 2010; Bandura, 1993; Chang, 2015; Gresham, 2009; Zaya, Kwalat, & Attach, 2016), and it is possible that elementary school structure has an impact on teacher math self-efficacy (Hood, 2010; Strohl, Schmertzling, & Schmertzling, 2014). This study examined the impact of this particular alternative school structure (departmentalization) on elementary teacher math self-efficacy.

Much can be learned from the examination of existing school programs, structures, and practices. Although the number of elementary schools implementing departmentalization in the United States is growing, there are still significantly less schools utilizing this structure (Hood, 2010). Therefore, opportunities to learn from existing examples of departmentalized elementary schools are limited. This study examined the lived experiences of elementary teachers in an existing departmentalized elementary school. School structures such as, but not limited to, collaborative practices, professional learning opportunities, and specific components of how departments are structured all impact teacher experiences, perceptions, and self-efficacy (Burch & Spillane, 2003; Garet, Porter, Desimone & Yoon, 2001). This study provided an opportunity to examine and learn from the existing structures of this particular elementary school. All that

was learned can be used to inform other schools that are already implementing departmentalization and those that are transitioning to a departmental structure.

Description of Study

This is a qualitative case study utilized a narrative presentation of data and an interpretive framework. I collected data and constructed the narratives of three elementary school teachers, all of which teach at an elementary school in Northern California that implements a departmental structure. The data collection took place over a two month period in the first semester of the year and consisted of a two tier data collection process. Each participant was interviewed, in person, for approximately 30 to 45 minutes. Each interview was then transcribed and summarized. The summary of each interview was sent to the participant and each participant was asked to review the summary, make any necessary corrections, contribute any additional stories, ideas, opinions and thoughts that they felt would contribute to the overall understanding of how departmentalization in an elementary school impacts teacher self-efficacy. As data for each participant was gathered, it was organized into a narrative and themes were identified when they developed. Ultimately, each interview and resulting narrative was first analyzed individually, and then the narratives were analyzed collectively to identify key commonalities and differences.

Conclusion

In order to improve math achievement in elementary schools across the United States, it is necessary to develop and implement structures that increase teacher efficacy and ensure that students have access to the best learning experiences possible (Burns, 2014; Leinwand & Fleischman, 2004; Strohl, Schmertzling, & Schmertzling, 2014). In the next chapter, I review the literature regarding both the traditional elementary school model and the departmental

elementary structure. I explore the deficiencies associated with the traditional single classroom model as they relate to math instruction and learning and I use the literature to paint a picture of why advocates of alternative elementary school structures contend that departmentalization is an answer to many of the existing issues. I review the literature regarding factors that impact teacher math self-efficacy and how teacher math self-efficacy impacts instruction and student achievement. This literature provides the foundation for the purpose of this study; the exploration of the impact of elementary school departmentalization on the self-efficacy of teachers teaching mathematics. What was learned is then compared to what is already known about teacher math self-efficacy in the traditional single classroom model. This research has the potential to then ultimately inform school structures and practices throughout the United States.

Chapter 2: A Review of the Literature

In this chapter, I present a literature based comparison of the traditional single classroom elementary model and an alternative model called departmentalization. I define each school structure in detail and explore the strengths and weaknesses of each. The literature provides a background as to how school structure impacts key practices related to instructional efficacy and student achievement such as teacher preparation, collaboration, and professional learning. Finally, I describe the recommendations for implementation of a departmental structure in an elementary school. It is important to note that in this dissertation, I define an elementary school as a school containing grades kindergarten through either five or six.

An Introduction to Mathematical Instruction and Achievement in the United States

In a world of increasing globalization and competition, American students are consistently falling short in mathematical achievement (Lui, 2011; Stigler & Heibert, 1997). This is especially true when compared to East Asian countries where mathematics is taught by content experts through guided exploration and discovery (Guttek, n.d.; Stigler & Heibert, 1997). In contrast, currently in the United States, mathematics is primarily taught procedurally rather than at the conceptual level that develops deep mathematical understanding, flexible thinking, problem solving, and perseverance (Ball & Bass, 2000; Leinwand & Fleischman, 2004). Nowhere is the lack of deep conceptual mathematics instruction more evident than at the elementary level (Burch & Spillane, 2003; Lui, 2011). This is especially alarming as elementary instruction is particularly impactful in determining the long-term mathematical success of students. Absent from a strong foundation in conceptual mathematics understanding, long term self-efficacy in mathematics most often begins to decline during or prior to a student's 7th grade year (Chang, 2015). It is imperative that we take a critical look at the current structures in

elementary schools to determine if there are changes that can be made to reduce deficiencies in mathematics instruction and improve the mathematical achievement of students in the United States.

The literature paints a clear picture of the myriad of challenges facing the majority of American elementary school teachers as they attempt to provide high quality mathematics instruction. Most elementary teachers are asked to expertly teach English, mathematics, science, and social studies (Chan & Jarman, 2004). In some states, they are even expected to teach physical education, art, and music as well. They face a significant challenge as they attempt to navigate, understand, and implement the dramatic changes associated with the adoption of the Common Core State content and practice standards in math (Dessoiff, 2012). This challenge is only compounded by the pressure and stress related to high stakes testing and accountability (Miller, 2010). Even teacher preparation programs fail to support multiple subject teachers as these programs focus primarily on general instructional practices rather than the building of content knowledge necessary to teach mathematics well (Ball & Bass, 2000). In this chapter, I first present an argument depicting why the traditional single classroom model makes it nearly impossible for elementary teachers to overcome these challenges and present the high quality mathematics instruction that United States students so desperately need.

It is not enough to simply identify the flaws in the traditional elementary school model. It is critical to also identify supports and structures that can be implemented to assist elementary teachers in their attempts to teach mathematics well. Although there is no “magic bullet,” one possible solution being researched is subject-based departmentalization within elementary schools (Ball & Lacey, 1984; Hood, 2010; Lui, 2011). In this chapter, I define and explain the history of departmentalization, identify the potential positive impacts associated with

departmentalization, acknowledge the perceived drawbacks of this strategy, and ultimately explain why this study contributes to the overall body of research associated with elementary departmentalization and teacher self-efficacy. Although there are potential benefits related to departmentalization for all subject areas, in this dissertation, I focus on mathematics.

Acknowledgment of the Current Condition of American Education

Before continuing this chapter and presenting the literature, I would be remiss if I failed to acknowledge the deep systemic issues in American education that impact student learning and equity regardless of school structure. The school system in the United States continues to permeate the deep-rooted realities of de-facto segregation, deficit thinking, disproportionate expectations, and white privilege (Baker, 2017; Dixson, 2011). Dixson (2011) states that “Public education has exacerbated the capitalist notion of ‘winners and losers’ that disproportionately affects students of color, especially low-income students of color” (p. 811). This is especially evident in low-income urban and rural schools where the majority of the population is composed of low-income students of color, yet less than twenty percent of teachers are racial/ethnic minorities (Cherng & Halpin, 2016). These students are predominantly taught by older white females that are often preconditioned by society to view students of color through a deficit mindset that contributes to self-determining low academic and behavioral expectations (Baker, 2017; Cherng & Halpin, 2016; Ingersoll & Merrill, 2010). These realities have led to the perpetual disenfranchisement of low-income and minority families as they struggle to invest, engage, and trust in a school system that continually fails the children in their communities (Luet, 2015; Watson & Bogotch, 2015). These major systematic deficiencies and inequities in the American educational system establish a reality that shapes the lens through which all educational research should be viewed. This includes the following literature related to school structure and teacher self-efficacy.

The Traditional Elementary Single Classroom Model

Throughout the history of the United States educational system, the primary structure of elementary education has been the single classroom model (Miller, 2010). In this model, elementary students remain in one classroom for the majority of the day and are taught all primary subjects by a single teacher. This model stems from the development of public school systems during the colonial and early national period. In 1647, the Massachusetts General Court established the Old Deluder Satan Act which required that any town of fifty families or more must establish a school and appoint a teacher to teach reading and writing (Guttek, n.d.). As the nation expanded, so did the subject matter taught in town schools. Overtime, schools eventually began to include arithmetic, religious studies, spelling, history, and science into their curriculum (Guttek, n.d.). Due to the rural and spread out nature of the nation, many early American schools were single room schools in which all ages were taught all subjects by a single teacher (Guttek, n.d.). Eventually, as populations centralized, grade levels became delineated by age and ability. Secondary schools formed and used a structure of subject specialization and departmentalization (Guttek, n.d.; Hood, 2010). However, elementary schools retained the single classroom model. Proponents of this structure assert that it allows teachers to build deep relationships with their students in which they understand and can respond the individual needs of each student. They also argue that this structure increases the likelihood that critical interdisciplinary connections will be made and that these connections are critical in the holistic academic development of young students (Hood, 2010).

Although there are clear advantages to the single classroom model, this structure also has some inherent weaknesses. In this dissertation, I focus on the weaknesses that relate specifically to elementary mathematics instruction. The traditional single classroom model creates three

significant obstacles that negatively impact mathematics instruction in elementary schools including (a) the difficulty associated with teaching four different subjects combined with an overall lack of mathematical expertise present in elementary education, (b) the new pressures and self-efficacy issues associated with the implementation of the common core state standards and the accountability linked to high stakes testing, and (c) the lack of time for collaborative planning and learning with other elementary teachers. Later in this chapter, I discuss a model called departmentalization and explore how the implementation of departmentalization in elementary schools can address these issues inherent within the single classroom model.

Mathematical Content Expertise

Elementary teachers in most educational systems are expected to teach English, mathematics, science, and social studies (Chan & Jarman, 2004). The expectation that a teacher expertly teach all of these subjects is simply unrealistic. This is especially true with mathematics. The single classroom model was developed and maintained under the presumption that foundational mathematics is procedural and should focus on basic skills, repetition, and memorization (Guttek, n.d.). However, it is not procedure based instruction that helps students make key conceptual connections, build problem solving skills and perseverance, and develop deep and applicable mathematical understanding that will serve as the foundation to their future learning (Ball & Bass, 2000; Leinwand & Fleischman, 2004). The teacher does not necessarily need to be a mathematician to teach elementary math, but the teacher must understand the underlying concepts and how they connect to past and future learning. The elementary math teacher must be able to connect content and pedagogy (Ball & Bass, 2000; Leinwand & Fleischman, 2004). It is problematic that the majority of elementary teachers and administrators are either generalists or experts in subjects associated with literacy and therefore prefer non-

scientific related subjects (Burch & Spillane, 2003; Miller, 2010; Rosenbloom, 1960). This often results in inadequate and unenthusiastic instruction in mathematics which inhibits the learning and achievement of American students (Burch & Spillane, 2003; Ball & Bass, 2000; Lui, 2011; Chan & Jarman, 2004; Leinwand & Fleischman, 2004; Miller, 2010).

Mathematics, in particular, is a subject that requires instruction that is conceptually based and able to link multiple concepts (Ball & Bass, 2000; Leinwand & Fleischman, 2004), yet due to a severe lack of mathematical expertise in American elementary schools, the majority of mathematics taught in elementary is done through instruction that is computationally and procedurally based (Burch & Spillane, 2003). Because the majority of teachers lack deep conceptual understanding in mathematics, and often confidence, they simply follow the step by step instructions laid out in the school adopted textbook (Ball & Bass, 2000; Leinwand & Fleischman, 2004). If initial mathematics instruction is procedural, it has been found that students often have difficulty developing a deep conceptual understanding of the content (Leinwand & Fleischman, 2004) and making key connections to related mathematical concepts (Ball Bass, 2000). Burns (2014) states that "Too often, mathematics instruction gives students the erroneous notion that learning math is all about learning procedures, rather than making sense of ideas" (p. 64), and that "We should be mindful of what our students understand, not merely what they can do" (p. 68).

That lack of mathematical expertise and often success associated with math instruction makes it difficult for elementary teachers to build a strong professional identity through positive instructional experiences (Lui, 2011; Schatz-Oppenheimer & Divr, 2013). A disproportionate number of elementary teachers report to experience high levels of math anxiety which leads to fear, discomfort, dislike, low self-esteem, and avoidance when teaching many mathematical

concepts (Gresham, 2009). Blazer (2011) defines math anxiety as “The negative emotions that interfere with the solving of mathematical problems” (p. 1). Math anxiety can be crippling as symptoms include increased heart rate, sweating, upset stomach, inability to concentrate, nervousness, doubt, and helplessness (Blazer, 2011). A study by Elizabeth Jackson (2008) on preservice elementary teachers found that 81% of the student teachers in the study experienced some kind of negative physical or emotional reaction when engaged in mathematics and 68% expressed feelings of inadequacy about teaching mathematics. Although this particular study only sampled a small population, it does provide a snapshot of an issue plaguing many US elementary classrooms.

Math anxiety inhibits efficacy as it limits the teacher’s ability and willingness to take risks and implement innovative and effective instructional practices (Gresham, 2009). The math anxiety, negative attitudes toward math, and math avoidance of teachers is often transferred to their students causing poor student performance in that grade and beyond (Blazer, 2011). When students experience math anxiety, they are less likely to demonstrate deep levels of learning and are far less likely to take productive learning risks (Taylor & Fraser, 2013). Math anxiety inhibits the student’s ability to use working memory and ultimately learn the subject matter content (Ramirez, Gunderson, Levine, & Beilock, 2012). As they struggle to learn the content, math anxiety is compounded. It typically begins to develop in students in the 4th grade and can progressively “snowball,” leading to increasing fear, dislike, and avoidance of mathematics as they continue through their educational career (Blazer, 2011; Gresham, 2009; Ramirez, Gunderson, Levine, & Beilock, 2012; Taylor & Fraser, 2013).

The Impact of Teacher Self-Efficacy on Student Learning and Achievement

The math self-efficacy of teachers impacts instructional practice, expectations, and ultimately student learning, self-perception, and achievement (Akay & Boz, 2010; Zaya, Kwalat, & Attach, 2016). When students are in classrooms with teachers that have low self-efficacy, their achievement is negatively impacted when compared with students in classrooms where teachers have high self-efficacy (Zaya, Kwalat, & Attach, 2016). Akay and Boz (2010) explain that this is especially detrimental for students that are already performing at levels lower than grade level expectations:

While some teachers advocate that “all students could learn”, other teachers don’t accept this. Teachers with low self-efficacy tend to fail low achievers and don’t accept responsibility in their academic achievements. These teachers regard themselves as authoritarian teachers and negatively affect their students’ attitudes and make them unconfident. On the other hand teachers with high self-efficacy regard low achievers as “accessible” and their learning problems as “solvable”. These teachers pride themselves because they help low achievers in their learning. Furthermore, teachers with high self-efficacy could provide good teaching because they don’t stress out (p. 62).

Negative impact of low student achievement expectations is especially prevalent in schools with a high number of students classified as living in a household of low socioeconomic status (abbreviated SES) (Agirdag, Van Avermaet, & Van Houtte, 2013; Belfi, Haelermans, & De Fraine, 2016; Rubie-Davies, Flint, & McDonald, 2011). The phenomenon known as “self-fulfilling prophecy” in education asserts that teacher expectations regarding the ability of students to learn and achieve is constructed based on perceptions regarding the SES of a family and the education level of the parents of a student (Agirdag, Van Avermaet, & Van Houtte,

2013; Belfi, Haelermans, & De Fraine, 2016). Teachers often focus on teaching basic skills and avoid higher level thinking activities when they have low academic expectations for their students (Belfi, Haelermans, & De Fraine, 2016). The result is that students then fulfill the low expectations of the teacher and achieve at lower levels than peers of high SES (Agirdag, Van Avermaet, & Van Houtte, 2013; Belfi, Haelermans, & De Fraine, 2016; Rubie-Davies, Flint, & McDonald, 2011). A study by Belfi, Haelermans, and De Fraine (2016) comparing the academic achievement in mathematics of students over time found that although the students in schools composed of mainly low SES initially scored higher on an assessment of mathematical understanding than did the students from schools of high SES, over time, those results altered dramatically. High SES students showed a significantly higher growth rate and ultimately surpassed their low SES counterparts by the sixth grade as they scored significantly higher on the assessments that measure math understanding (Belfi, Haelermans, & De Fraine, 2016).

The research acknowledges that there are a variety of reasons that SES impacts student achievement (Agirdag, Van Avermaet, & Van Houtte, 2013; Belfi, Haelermans, & De Fraine, 2016; Rubie-Davies, Flint, & McDonald, 2011). The research is also clear that teacher expectations regarding student ability to learn is a significant factor in predicting student achievement in mathematics (Agirdag, Van Avermaet, & Van Houtte, 2013; Belfi, Haelermans, & De Fraine, 2016; Rubie-Davies, Flint, & McDonald, 2011). Teacher self-efficacy impacts their perceptions of student ability to understand deep mathematical content, demonstrate growth, and achieve academically in mathematics (Akay & Boz, 2010; Zaya, Kwalat, & Attach, 2016). Teacher self-efficacy is therefore especially critical in elementary schools that are not classified as being composed of students of high socioeconomic status. Teachers of high self-efficacy are more likely to believe in their own instructional ability and the ability of all students

to learn and achieve. In turn, students will respond to the belief of the teacher and are more likely to meet the academic expectations that the teacher has established (Agirdag, Van Avermaet, & Van Houtte; Akay & Boz, 2010; Belfi, Haelermans, & De Fraine, 2016; Rubie-Davies, Flint, & McDonald, 2011; Zaya, Kwalat, & Attach, 2016).

High Stakes Testing, Common Core, and the Impact on Teacher Self-Efficacy

In addition to math anxiety and a general lack of mathematical content expertise, the self-efficacy of elementary teachers is also greatly impacted by the pressures associated with high stakes testing and the shifting expectations of mathematical instruction and achievement under the new Common Core State Standards (Von Der Embse, Sandilos, Pendergast, & Mankin, 2016). Under No Child Left Behind, state tests were created to hold teachers accountable for their students' ability to score well on multiple choice tests. These state tests centered predominantly on facts, procedures and answer getting, not on conceptual understanding and thought process (Dessoiff, 2012). This reinforced many of the detrimental, procedure based teaching techniques that lead to shallow conceptual understanding, underdeveloped problem solving skills, and a lack of engagement (Burns, 2014; Leinwand & Fleischman, 2004). Recently, these tests have been replaced as the majority of states have adopted the new Common Core State Standards for Mathematics.

With the implementation of Common Core, teachers now face an entirely new set of challenges. The new high stakes tests go beyond multiple choice questions to include structured response items, constructed response items, extended response items, and problem-based tasks. The questions are designed to assess not only the students' ability to arrive at a correct answer, but also their ability to explain and justify their thinking through writing and multiple representations (Dessoiff, 2012, Wilson, 2014). In the section above, I established that teaching

mathematics conceptually can be extremely difficult without the content level expertise that is widely lacking in elementary schools (Ball & Bass, 2000; Leinwand & Fleischman, 2004; Miller, 2010), yet it is conceptual based instruction that is going to be critical in preparing students for success on these new assessments. In addition, the inclusion of writing expectations generates an additional need for expertise as mathematics has a uniquely technical language and communication style that teachers must understand and be comfortable with in order to teach their students well (Marks & Mousley, 1990). The common core state standards for mathematics include eight mathematical practice standards. The sixth practice standard pertains to the ability of a student to precisely and appropriately use mathematical language when communicating (California. Department of Education, 2013). Although the complexity of the language and communication expectations is limited in the earlier grades, it is vital to future success that teachers begin to build the foundations of linguistic understanding and the ability to speak and write using technical mathematical language (California. Department of Education, 2013; Marks & Mousley, 1990).

The lack of mathematical expertise present in the traditional single classroom model, compounded by low achievement on high stakes state testing, creates a self-perpetuating cycle of failure that will only contribute to low teacher self-efficacy and increased math anxiety (Gresham, 2009). Teacher self-efficacy is directly tied to positive instructional experiences and student success (Gresham, 2009; Strohl, Schmertzing, & Schmertzing, 2014). The inverse is also true. When teachers experience negative instructional experiences, and their students struggle on common core mathematics assessments, teacher self-efficacy will decrease. When teachers have low self-efficacy, they are more likely to practice math avoidance and devote less time to teaching that content (Strohl, Schmertzing, & Schmertzing, 2014). They view their struggles and

failures in mathematics instruction as indicators that future efforts will be inept and futile (Gresham, 2009). It is easy to see how this cycle of failure and avoidance will ultimately have a significantly negative impact on the students in classrooms of underprepared and ineffective teachers of elementary mathematics.

Lack of Collaboration and Planning Time

The opportunity for teachers to collaborate around planning and instruction can have a significant impact on practice and self-efficacy. This is especially true with mathematics (Burch & Spillane, 2003). Teachers often rely upon each other to develop mathematical content knowledge and effective instructional techniques. Collaborative teacher networks can effectively facilitate and support this development as they provide the opportunity for collective thought, research, and action (Ball & Lacey, 1984; Burch & Spillane, 2003; Wilson, 2014). Due to the demands of teaching multiple subjects and the structure of the school day, elementary teachers rarely have to time to come together and collaboratively focus on developing mathematical content knowledge and pedagogy (Goddard, Goddard & Tschannen-Moran, 2007). Teaching in isolation impedes professional growth as teachers are forced to “rely on trial and error and fall back on their own memories of schooling for models of teaching” (Goddard, Goddard & Tschannen-Moran, p. 878).

Teacher efficacy and math self-efficacy are both negatively impacted by the lack of collaborative planning time for elementary teachers. Teacher efficacy is built through collaborative experiences and learning (Chang, 2015) and the positive impact of collaboration is even greater when teachers are able to narrow their focus and concentrate on one subject (Strohl, Schmertzing, & Schmertzing, 2014). It is clearly more difficult for teachers to narrow their focus if they are responsible for teaching four subjects on a daily basis. Given the overall lack of

math specific content expertise at the elementary level (Ball & Bass, 2000; Leinwand & Fleischman, 2004; Miller, 2010), the lack of focused collaborative planning and learning time for math is especially detrimental as it limits growth, understanding, and the preparedness that would ultimately increase self-efficacy (Strohl, Schmertzing, & Schmertzing, 2014). Teachers do not have the opportunity to build their own conceptual understanding and then discuss with colleagues how to best present that content to their students. They are also denied the time necessary to collaboratively evaluate student work and use it as formative assessment to guide future instructional content and practice (Burch & Spillane, 2003; Marshall, 2002).

Departmentalization

In the above section, I identified many of the deficiencies related to teacher efficacy and math self-efficacy that are inherent within the traditional single classroom elementary model. In this section, I explore departmentalization, an alternative model that many school sites and districts across the United States are implementing as a possible solution (Hood, 2010). I begin by defining departmentalization. Next, I acknowledge and present the primary critiques of the departmentalization model. The remainder of this section will then highlight many of the potential benefits of this model as it relates to math instruction and achievement including (a) an increase in the level of mathematical expertise and efficacy, (b) the ability to provide focused and timely professional development, (c) the increased opportunity for collaborative planning and growth, and (d) the positive impact of departmentalization on teacher math self-efficacy and action.

Defining Departmentalization

Departmentalization, which has also been coined *platooning* (Hood, 2010), has taken many forms within elementary education due to the variation in circumstances from school to

school and from district to district. For the purpose of this review, I focus on subject-based departmentalization, not simple grade level departments. Subject-based departmentalization occurs when the teachers at an elementary school are commissioned to teach only one or two of the four primary subjects (Hood, 2010; Lui, 2011). This definition includes, but is not limited to the following examples of possible structures:

- Multiple teachers at a specific grade level teach either one subject or two of the same subjects (Hood, 2010; Lui, 2011). Typically, if teachers are expected to teach two subjects, they teach mathematics and science, or they teach English and history.
- Only one teacher at each grade level teaches one or two specific subjects, but this structure is implemented at more than one grade level (Ball & Lacey, 1984). For example, one third grade teacher teaches both math and science, and this structure is replicated in the fourth, fifth, and sixth grades creating a math and science department at the school that spans multiple grade levels.

There are many variations of the above two structures that constitute departmentalization. Some schools and districts face circumstances that cause them to create subject-based departments made up of only one person, but in this study, I only focus on departments composed of at least two teachers.

Departmentalization has long been a staple of 7-12 education. In contrast to the single classroom model, secondary teachers typically teach only one subject to multiple groups of students (Hood, 2010). This naturally creates subject specific departments at most secondary schools. Although departmentalization has become more prevalent in elementary schools over the last 20 years, as of 2010, approximately 80% of elementary schools were not using any form

of subject-based departmentalization (Hood, 2010). In the following sections, I present the primary arguments for why more elementary schools may want to consider a transition to a department based model.

Primary Critiques of Departmentalization in Elementary Schools

Over the next few pages I explore in depth the overwhelming benefits associated with departmentalization in elementary education, but first I feel that it is prudent to acknowledge the potential disadvantages of this structure as pointed out by critics. The most prominent argument against departmentalization centers on student-teacher relationships. Departmentalization reduces the time that one single teacher has with a group of students. This potentially limits the depth of student-teacher relationships that are viewed to be critical for the development of young students (Hood, 2010; Lui, 2011). Proponents of departmentalization point out that in most departmental structures, students still spend the vast majority of their time with only two different teachers and spend several hours with each on a daily basis. This is still a significant portion of time and in this model, students have the benefit of being exposed to the wisdom and multiple perspectives of more than one educator each year of elementary school (Chan & Jarman, 2004).

Another primary argument against departmentalization claims that there is a potential of limiting teacher efficacy in making cross-curricular connections for students. Within departments, teachers only focus on one or two subjects and this may reduce the identified and purposefully planned connections that can be made across subject areas (Hood, 2010; Lobdell & Van Ness, 1963; Lui, 2011). Advocates of departmentalization, especially those focused on mathematics, agree that building cross-curricular connections is absolutely critical to providing context and relevance to content that students are learning (Leinwand & Fleischman, 2004).

However, these advocates argue that departmentalization leads to increased content expertise and this ultimately increases the teacher's understanding of how mathematics connects to other school curriculum. This understanding allows teachers to effectively plan cross-curricular lessons connecting mathematics to other content and real-world experiences (Ball & Bass, 2000; Leinwand & Fleischman, 2004; Lui, 2011).

Additionally, there is a concern that the changes involved with moving between classes and teachers may create stress that would be detrimental for student learning. The concern is that elementary students are concrete in their thought process and the changing of teachers and classrooms would prove too confusing for them (Lui, 2011). One possible solution for this is that teachers rotate classrooms rather than the students, but opponents of departmentalization argue that the transitions involved in switching teachers and possibly classrooms take time that could be better used for instruction and learning (Lui, 2011).

In addition to these critiques, I also acknowledge that there is a current lack of teachers at the elementary level with a math focus (Burch & Spillane, 2003; Miller, 2010; Rosenbloom, 1960). It is reasonable to assume that if all elementary schools were to transition to departmental structures, there would not be enough math teachers to meet the staffing needs. Therefore, as departmentalization increases in the United States, it will be necessary to find ways to hire, prepare, and attract more math teachers for the elementary level. This would need to include recruitment, changes to teacher preparation programs, and professional development to help existing teachers improve their content knowledge and math pedagogy (Walker et al., 2013).

Mathematical Expertise and Efficacy

Departmentalization provides the opportunity for teachers to become instructional specialists in their strongest content areas (Chan & Jarman, 2004; Lui, 2011). This is particularly

beneficial in mathematics because when teachers have a high level of content expertise, they are more likely to make key content specific conceptual connections that are necessary for deeper learning and understanding. They are able to ask rich questions, explore multiple solution pathways, and embrace multiple representations (Ball & Bass, 2000). Quality mathematical instruction activates student learning and enthusiasm (Ball & Bass, 2000; Lui, 2011; Leinwand & Fleischman, 2004). Burns (2014) correctly points out:

Even with elementary math topics that seem fairly uncomplicated and easy to understand, unexpected twists and turns can emerge during classroom teaching. But if our math knowledge as teachers is robust enough, we can treat these surprises not as difficulties but as opportunities to guide students in uncovering their understanding of mathematics. (p. 68)

It is also critical that in a rapidly changing and advancing global environment, a teacher is able to prepare students for mathematical and technical challenges that do not presently exist (Rosenbloom, 1960). In order to prepare students to take on challenges, innovation, and information that extend beyond the realities of the time in which they are being taught, Rosenbloom (1960) stresses the need to teach reasoning, number theory, and the art and conceptual realities of mathematics. This type of instruction and learning truly prepares students for the unknown (Rosenbloom 1960).

Teacher efficacy has been established as a specific variable that accounts for the variance in effectiveness when comparing teachers (Chang, 2015). Specifically, there is a direct relationship between teacher efficacy and student efficacy in mathematics (Chang, 2015). Departmentalization provides a structure that allows for only those teachers that are most confident, knowledgeable, and enthusiastic about mathematics to teach that content (Lui, 2011).

Expertise and preparedness increase self-efficacy and reduce stress (Gresham, 2009; Strohl, Schmertzing, & Schmertzing, 2014). Teachers that have high math self-efficacy tend to be more open to innovation and risk taking in their instructional practice (Gresham, 2009) as they are not limited by the feelings of inadequacy and fear associated with math anxiety (Ramirez et al., 2012; Marks & Mousley, 1990). This greatly increases the probability that students will be exposed to instruction that is most likely to provide them with the conceptual and linguistic knowledge necessary to achieve academically (Ball & Bass, 2000; Lui, 2011; Leinwand & Fleischman, 2004; Marks & Mousley, 1990).

Formative assessment. One area of instruction in which mathematical content expertise can have an especially significant impact on student growth and achievement is the use of formative assessment (Hattie, 2012; Leinwand & Fleischman, 2004; Wiliam, 2011). When done effectively, providing students with formative feedback has a greater impact on student achievement than any other instruction based variable (Hattie, 2012; Wiliam, 2011). In fact, Dylan Wiliam (2011) argues that formative feedback can double the rate of student learning. For feedback to be effective it must be based on evidence and analysis of student learning, and teachers are best able to assess student conceptual understanding if they are math content experts (Leinwand & Fleischman, 2004).

In their book *Inside the Black Box* (1998), Black and Wiliam define formative assessment:

We use the general term *assessment* to refer to all those activities undertaken by teachers—and by their students in assessing themselves—that provide information to be used as feedback to modify teaching and learning activities.

Such assessment becomes *formative assessment* when the evidence is actually used to adapt the teaching to meet student needs (p. 140).

Formative assessment begins when a teacher strategically presents a question, prompt, or statement that is designed to elicit student responses that will allow the teacher or the students' peers to gather evidence that can be used to measure not only what students are learning, but also how they are learning it (Briggs, 2007; Marshall, 2002). This practice of assessing and understanding the "how" of learning marks a major deviation in historical American assessment practices. Briggs (2007) states that "American students have for some time now been held much more accountable for what they know than how they know it" (p. 64). That being said, the evidence that is gathered through assessment is only as useful as how it is then used. As stated by William when interviewed by Marshall (2002), assessment "Is formative only if it leads to successful learning and that assessment has played a key role in that learning" (p. 48). The assessment is able to play this key role by informing and guiding both instruction and feedback when teachers are able to appropriately evaluate the evidence using their content expertise (Ball & Bass, 2000; Leinwand & Fleischman, 2004).

The gathering of evidence through formative assessment provides the teacher with information that allows them to make real-time decisions about how to proceed with their instruction (Marshall, 2002; William, 2011; William & Black, 1998). Teachers are able to determine the level of understanding of the students in their classroom in general and on an individual basis. Teachers can then respond to this information using a variety of instructional techniques including, but not limited to, the use of appropriate questioning, the providing of customized remediation, scaffolding, extension activities, and the implementation of strategic pairing or grouping. It is critical that the classroom teacher has the expertise necessary to

evaluate and react to evidence of mathematical understanding as it is this evidence based instruction that provides students with the learning opportunities that are most relevant to their individual learning needs (Ball & Bass, 2000; Leinwand & Fleischman, 2004; Wiliam, 2011).

Focused Professional Development and Opportunities for Collaboration

Professional development is a primary driver in increasing teacher efficacy (Chang, 2015), and teacher self-efficacy is improved when the scope of learning is narrowed and designed to help teachers develop specialized content expertise (Strohl, Schmertzing, & Schmertzing, 2014). Professional development, synonymously referred to as professional learning, is the vehicle that provides the link between research and instructional practice. The majority of teachers want to be successful. They want their students to achieve at the highest possible level, but they often lack the pedagogical knowledge and skill necessary to accomplish this goal (Garet, Porter, Desimone, Birman, & Yoon, 2001). As teachers are continually grappling with the wide varieties of student learning needs and the new and more rigorous expectations of Common Core mathematics, it is necessary that they are provided with learning opportunities that best support them in the development of their content knowledge and instructional capability (Marrongelle, Sztajn, & Smith, 2013; Wilson, 2014).

There is clear evidence that professional development has a positive impact on teacher capacity and student achievement (Chang, 2015; Wayne, Yoon, Zhu, Cronen, & Garet, 2008) and there are some widely agreed upon aspects of professional development that are identified to be most effective. Professional development should cohesively build upon itself over a duration of time. “One shot” professional development sessions are recognized to be ineffective (Garet, Porter, Desimone, Birman, & Yoon, 2001; Wayne, Yoon, Zhu, Cronen, & Garet, 2008).

Professional development is most effective when it incorporates experiences that relate as closely

as possible to the reality of the everyday classroom. The learning must be transferable and practical (Desimone, 2010; Garet, Porter, Desimone, Birman, & Yoon, 2001; Wayne, Yoon, Zhu, Cronen, & Garet, 2008). The learning should be active, engaging, and the participants should have the opportunity to collaborate and learn from colleagues in various roles in education (Garet, Porter, Desimone, Birman, & Yoon, 2001; Marrongelle, Sztajn, & Smith, 2013; Wayne, Yoon, Zhu, Cronen, & Garet, 2008). Finally, as the professional development continues, formative assessment should be used to structure future learning to best meet the emerging needs of the participants (Marrongelle, Sztajn, & Smith, 2013).

It becomes clear that a departmentalization model provides the opportunity to implement focused professional development that best aligns to the practice listed above. Sustained professional learning with a mathematical focus links one mathematical concept to the next and builds a repertoire of math specific instructional practices and strategies (Wilson, 2014). Because the teachers do not need to focus on four unique subjects, they are able to go beyond basic teaching methods and immerse themselves more deeply into learning targeted for the one or two subjects that they teach (Lui, 2011). This will ultimately increase teacher self-efficacy, expertise, and preparedness (Chang, 2015; Strohl, Schmertzing, & Schmertzing, 2014).

Along with professional development, one of the greatest impacts on teacher efficacy is productive collaboration with colleagues (Chang, 2015). Departmentalization provides a structure that creates the opportunity for meaningful and targeted collaboration. If teachers are able to concentrate on only one or two subjects, they are then able to go beyond the surface level and dig much deeper into the content and pedagogy (Ball & Lacey, 1984; Lui, 2011). The infusion of subject-specific expertise allows teachers in departments to learn from and build upon the knowledge and experiences of one another (Burch & Spillane, 2003; Hood, 2010; Lui,

2011). Finally, collective learning and planning facilitates consensus building on appropriate content to be taught, best instructional approaches to use, and important conceptual connections to make. When consensus is built through internal collaboration, there is often a decrease in teacher resistance and anxiety and an increase in collaborative support and accountability (Ball & Lacey, 1984; Burch & Spillane, 2003; Chan & Jarman, 2004; Hood, 2010).

The Impact on Self-Efficacy

Throughout this section, I have repeatedly referenced the impact each benefit has on self-efficacy. This is for good reason. Teacher self-efficacy has been shown to have a significant impact on instructional practice, student achievement, teacher expectations, collaborative practice, teacher satisfaction, and burn-out rate (Bandura, 1993; Chang, 2015; Gresham, 2009; NURLU, 2015; Strohl, Schmertzing, & Schmertzing, 2014; Zaya, Kwalat, & Attach, 2016). Teachers with high math self-efficacy are more likely create learning environments the embrace risk and strive for deep conceptual understanding of math content (Gresham, 2009; NURLU, 2015; Zaya, Kwalat, & Attach, 2016). These teachers are more likely to set high expectations for instruction and the achievement of their students and to demonstrate the perseverance necessary to achieve their goals (NURLU, 2015; Zaya, Kwalat, & Attach, 2016). In addition, high self-efficacy has been shown to correlate with positive relationships and engagement with both parents and students (NURLU, 2015; Strohl, Schmertzing, & Schmertzing, 2014).

Zaya, Kwalat, and Attach (2016) provide a simple, but applicable definition of self-efficacy when they state, “Self-efficacy means the belief in one's potentialities” (p. 93). Specific to the focus of this paper, teacher math self-efficacy is the belief that the teacher not only has the appropriate mathematical content knowledge, but also has the confidence in personal ability to put that mathematical knowledge into action effectively (Zaya, Kwalat, & Attach, 2016). This is

especially relevant in elementary mathematics where most practitioners have the ability to do the math problems, but not all have the confidence in their ability to teach the content effectively and conceptually (Ball & Bass, 2000; Zaya, Kwalat, & Attach, 2016). Self-efficacy theory stems from the work of Albert Bandura. Bandura (1993) focused on the concept of human agency which asserts that people self-influence their perceptions and constructions of reality. These perceptions and constructions impact their motivation, their affect, and ultimately, their actions (Bandura, 1993). It is therefore critical that we implement a structure that places teachers with high math self-efficacy in positions that allow them to focus specifically on teaching math in elementary schools. Teachers with high math self-efficacy have the motivation to set high expectations, the ability to develop conceptual understanding, and the willingness to act in implementing the instructional practices that will have the greatest positive impact on student achievement (Bandura, 1993; Chang, 2015; Gresham, 2009; NURLU, 2015; Strohl, Schmertzing, & Schmertzing, 2014; Zaya, Kwalat, & Attach, 2016).

Recommendations for Implementation

Given the clear and significant advantages of departmentalization, Chan and Jarman (2004) state that the implementation of this model is a worthy venture. They offer three recommendations as to how to successfully implement this structure. First, schools should start by piloting departments in the upper elementary grades to begin. These students are older and likely more able to successfully adjust to this new structure. They are also closer to entering middle school and the change to departmentalized instruction may help in their transition. Second, schools should be flexible and willing to try multiple types of student grouping until they find one that works best. Finally, schools should gather and analyze data on both student

achievement and on teacher satisfaction. The schools should then use this data to make appropriate adjustments (Chan & Jarman, 2004).

The process of piloting and implementing departmentalization should be done strategically and intentionally. Frank, Zhao, and Borman (2004) provide a useful framework for educational innovation that they term “diffusion.” In this process, innovation begins with those in the organization that have social capital and expertise and the innovation is then diffused throughout the organization based on perceived value and social pressure. They explain:

In these organizations, it is not a simple matter of making collective decisions to adopt and then implement innovation. Instead, the process is more one of diffusion of innovation within the organization, since each actor has some autonomy to make his or her own decision partly in response to the ideas, information, and other social forces to which he or she is exposed (p. 150).

In this process, the innovators take the lead and ultimately provide the resources that allow the rest of the organization to embrace the innovation with increased confidence and reduced stress (Frank, Zhao, & Borman,2004). Members of an organization share in the fate of the organization and therefore are more willing to support each other and share resources in order to improve the shared fate of the organization as a whole (Frank, Zhao, & Borman,2004).

The innovation diffusion process is most effective when the early innovators have both expertise and social capital (Frank, Zhao, & Borman,2004). Expertise and experience often contribute to confidence and willingness to take risks. Experienced teachers also typically experience less stress than novice teachers and reduced stress and a lighter workload are both factors that make it more likely that a teacher will embrace innovation and change (Frank, Zhao, & Borman,2004). It is equally important that the early innovators have social capital within the

organization. When those in a network with high social capital implement something that appears to be effective and beneficial, a social pressure develops and all members of the network are pushed to embrace the innovation that is likely good for the network as a whole (Bryk, Gomez, & Grunow, 2011; Frank, Zhao, & Borman, 2004). Members of a school organization derive social and psychological rewards from their role and status in that organization. This drives the pressure to conform and can be used as a catalyst for the diffusion of innovation (Bryk, Gomez, & Grunow, 2011; Frank, Zhao, & Borman, 2004).

Concluding Discussion and Recommendations for Further Research

There is no single strategy or structure that can instantly solve all of the issues related to mathematics instruction and learning in America. That being said, the research on departmentalization reveals that there are benefits of this alternative model that make it a logical structure to implement when trying to address the current deficiencies of elementary math instruction and achievement. All of these benefits contribute to improving teacher math self-efficacy which is known to be a significant predictor of student growth and achievement (Chang, 2015; Gresham, 2009; NURLU, 2015; Strohl, Schmertzing, & Schmertzing, 2014; Zaya, Kwalat, & Attach, 2016). Departmentalization allows for the mathematical specialization and expertise necessary to connect concepts and build deep understanding (Ball & Bass, 2000; Lui, 2011; Leinwand & Fleischman, 2004). This structure also makes it easier to provide targeted professional development and structured collaborative planning opportunities (Chan & Jarman, 2004; Lui, 2011). The expertise, professional learning, and collaborative experience are components likely to promote increased math self-efficacy. This directly impacts teacher expectations, motivations, affect, and actions (Bandura, 1993; Chang, 2015; Gresham, 2009; NURLU, 2015; Strohl, Schmertzing, & Schmertzing, 2014; Zaya, Kwalat, & Attach, 2016).

Because teacher self-efficacy is such a key factor in determining the mathematical understanding and achievement of students, it is necessary to identify and understand what school structures and systems impact teacher math self-efficacy. There is a hole in the research regarding the impact of school structure on elementary teacher self-efficacy. Specifically, there is a need to comparatively analyze the impact of elementary departmentalization on teacher math self-efficacy with that which is already known about teacher math self-efficacy in the traditional single classroom model. Math self-efficacy directly impacts math instruction and student achievement in the classroom. This research should seek to understand the experiences of teachers and the impact of various factors on teacher perceptions and math self-efficacy. Contributing factors to be studied may include, but are not limited to: types of departmental structures, administrative influence, design of professional development, team dynamics, collaborative structures, teacher prior experience, student math self-efficacy, and student demographics.

In the following chapter, I explain in detail the design of my dissertation study. In the study, I explored and analyzed the narratives of three teachers that are teaching or have taught elementary mathematics in a school that implements a departmental model. The purpose was to develop an understanding of the impact participation in a departmental model has on the self-efficacy of each teacher involved. The study allows us to learn from their experiences in order to identify and analyze specific factors that impact teacher self-efficacy in a departmental school structure. This developed understanding can then be compared with the research related to teacher math self-efficacy in the traditional single classroom model that is referenced above. Ultimately, the findings of this research should be used to inform decisions about school structure in elementary schools across the United States.

Chapter 3: Methodology

Mathematical instruction and student achievement in the United States are falling short when compared to nations across the globe (Lui, 2011; Stigler & Heibert, 1997). A critical examination of the traditional structures and practices related to mathematics instruction is necessary. As I argued in the previous chapter, because of the inherent advantages of content specific departmentalization, it is reasonable to believe that an increasing number of elementary schools across the United States will implement departmental structures (Ball & Lacey, 1984; Chan & Jarman, 2004; Collopy & Bowman, 2012; Hood, 2010; Lui, 2011). This structure allows elementary mathematics teachers to become experts in their content areas through independent learning, collaboration with other mathematics teachers, and specialized and relevant professional development opportunities (Ball & Lacey, 1984; Chan & Jarman, 2004; Collopy & Bowman, 2012; Lui, 2011). Departmentalization also allows administrators to place teachers that are interested and comfortable with mathematics in those instructional roles. This is especially significant given that the majority of elementary teachers in the traditional single classroom model are either generalists or experts in subjects associated with literacy (Burch & Spillane, 2003; Miller, 2010). Many of these teachers experience a math anxiety that hinders their instruction and can be transferred to students (Gresham, 2009; Ramirez, Gunderson, Levine, & Beilock, 2012; Taylor & Fraser, 2013). If administrators are able to place teachers in the content areas where they are comfortable and confident, self-efficacy and instructional efficacy will likely both increase and students will benefit (Ball & Bass, 2000).

The purpose of this study was to explore the experiences and the math self-efficacy of elementary teachers who teach in a school implementing a departmental structure. What was learned in the study is then compared to what is already known about teacher perceptions and the

math self-efficacy of those in a traditional single classroom model. This research study addressed the following question: How does a departmental structure influence the experiences, perceptions, and self-efficacy of elementary teachers as each relates to mathematics instruction?

Significance of Study

In elementary school, students develop the conceptual understandings that serve as the foundation for the mathematics learning that will take place throughout the rest of their educational career. Therefore, students must be exposed to the highest possible level of mathematics instruction during these crucial and pivotal years (Ball & Bass, 2000; Leinwand & Fleischman, 2004). Departmentalization provides the opportunity for teachers to become instructional specialists within their strongest content areas (Chan & Jarman, 2004; Lui, 2011). This is particularly beneficial in mathematics because when teachers have a high level of content expertise and high math self-efficacy, they are more likely to make the key content specific conceptual connections necessary for deeper learning and understanding. Teachers are able to ask rich questions, take risks, explore multiple solution pathways, and embrace multiple representations (Ball & Bass, 2000). This quality of mathematics instruction activates student learning and enthusiasm (Ball & Bass, 2000; Lui, 2011; Leinwand & Fleischman, 2004). Therefore, exploring the impact of a departmental structure on elementary teacher math self-efficacy is significant.

A Qualitative Case Study using a Narrative Presentation of Data

The purpose of this study was not to examine numerical data to determine the impact of departmentalization on student achievement. Instead, in this study, I was interested in learning from and comparing the math related experiences and self-efficacy of elementary teachers in a departmental structure with that which is already known about the traditional single classroom

model. My goal was to better understand the impact of school structure on teacher self-efficacy in hopes of informing future policies, structures, decisions, and research as this is the primary purpose of qualitative research (Merriam, 2009). Although there is great value in education research that utilizes and analyzes quantitative data, this type of research is often ridged, unresponsive, and therefore limiting in the type of learning that can occur (Flick, 2009). The flexibility and responsive nature of qualitative research allows it to serve as an alternative or complimentary form of research and is an especially valuable tool in research focused on the social sciences, including education (Caine, Estefan, & Clandinin, 2013; Flick, 2009; Merriam, 2009; Seidman, 2006). In educational research, we study and learn from people and their experiences, not just numbers. Our research subjects can think and talk and this is embraced as the researcher chooses methodologies and methods that allow for the construction of a deeper overall understanding of an issue (Seidman, 2006). The researcher is able to move beyond simply testing the known and is instead able to gather data that allows them to expose and explore new realities that can only be understood by learning from the experiences and perceptions of the participants (Flick, 2009; Merriam, 2009; Seidman, 2006).

One of the most effective ways to construct an understanding of a situation is by learning from the stories of the actors involved (Gubrium & Riessman, 2001; Seidman, 2006) as it is often the stories behind the statistics that provide insight into the phenomenon that exists (Schaefer, Downey, & Clandinin, 2014). “Stories are how we make sense of our experiences, how we communicate with others, and through which we understand the world around us” (Merriam, 2009, p. 32). Narratives depict the stories of participants so that consumers can make meaning of experiences and develop deeper understanding about issues and events (Jones, Torres, & Arminio, 2014; Lal, Suto, & Ungar, 2012; Schatz-Oppenheimer, & Dvir, 2013). “The

stories that people tell are the vehicles through which experiences are studied” (Lal, Suto, & Ungar, 2012, p. 6) and provide the window through which the reader can view, experience, and interpret the similarities and differences between their own lived experiences and those of the subject in the narrative (Seiki, 2014). Narrative based research holds to the truth that the telling of stories is a core social action and is a tool that humans use to make sense of their experience (Merriam & Tisdell, 2016). It is therefore valuable to research and learn from stories of human experiences to understand how individual realities are constructed and how those realities impact perception and action (Gubrium & Riessman, 2001; ; Jones, Torres, & Arminio, 2014: Lal, Suto, & Ungar, 2012).

Narrative based research is by no means new. The roots of this methodology can be traced back as far as 335 BC when Aristotle examined the purpose of poetry and drama (Lal, Suto, & Ungar, 2012). More recently, beginning in the 1960s and expanding in popularity in the 1990s, researchers began using narrative based research to move beyond the “what” and began to focus on who was telling the story and why they were crafting the narrative in the way that they did (Gubrium & Riessman, 2001; Lal, Suto, & Ungar, 2012; Merriam, 2009; Merriam & Tisdell, 2016). Stories are not objective by nature and narrative based research “does not assume objectivity but, instead, privileges positionality and subjectivity” (Gubrium & Riessman, 2001, p. 3). Narratives are formed through the unique lens of the narrator. Therefore, the same exact event or experience can be portrayed completely differently when the story is told by different people. Every person incorporates their own beliefs, past experiences, and perception when crafting their personal narrative of an event (Gubrium & Riessman, 2001; Jones, Torres, & Arminio, 2014). This reality holds true for teachers and as the teachers in this study described

their experiences related to math instruction, there was much to be learned not only from what actually happened, but also from how the teachers narrated these events when interviewed.

“Narrative inquiry is marked by its emphasis on relational engagement,” (Caine, Estefan, & Clandinin, 2013, p. 577) and focuses on the dynamics involved as the researcher and participant engage in co-creation of the narrative (Caine, Estefan, & Clandinin, 2013).

Narratives are developed through mutual engagement and decision making as the participant makes decisions about what information to provide and how to express it and the researcher decides what information to focus on, how to interpret the data provided, and ultimately, how to portray the data in narrative form (Nichols, 2015). It is my goal to compose narratives that illustrate that which happens naturally in order to develop an expansive view of the impact of school structure on math instruction and teacher self-efficacy in elementary school (Berkowitz, 1989). However, it is critical to note that any time a participant interacts with a researcher, including through interviews and observation, their actions are affected (Berkowitz, 1989; Flick, 2009). This is a reality that is embraced and accepted in qualitative research (Flick, 2009), and in narrative inquiry specifically, the researcher is tasked with including their interactions, perceptions, and interpretations throughout the study as part of the overall narrative presented to the reader (Clandinin & Connelly, 1989; Merriam & Tisdell, 2016; Nichols, 2015). The narrative of the participant and researcher become unavoidably intertwined and it is therefore appropriate to talk about the researcher’s narrative in the process of collecting data and composing the narrative (Clandinin & Connelly, 1989). It is the responsibility of the narrator to not simply write the story, but to find it and make decisions of how to portray the narrative for the intended audience (Clandinin & Connelly, 1989; Merriam & Tisdell, 2016).

Narrative inquiry is particularly appropriate for educational research because of the dynamic and complex nature of this research. As Clandinin and Connelly (1989) correctly point out, to study education is to study experience. The self-identity of teachers is uniquely tied to professional identity and experience in a way that is not characteristic of most other professions (Schaefer, Downey, & Clandinin, 2014). Teacher experiences and related perceptions, both real and imagined, impact self-efficacy and shape the collective professional and personal identities of educators (Schaefer, Downey, & Clandinin, 2014). “Education, experience, and life are inextricably intertwined.” (Clandinin & Connelly, 1989, p. 7). This reality is difficult to study quantitatively as it is simply too complex. The qualitative narrative inquiry provides a lens through which to view the phenomenon that exist in education in a way that is holistic and most true to reality (Clandinin & Connelly, 1989; Schaefer, Downey, & Clandinin).

Narrative-based research has established a prevalent footprint in educational research that focuses on building understanding of the experiences, perceptions, and constructions of self-identities of teachers (Schaefer, Downey, & Clandinin, 2014) and it is valuable here to explore a few examples of when this methodology has been used successfully in educational research:

- Shatz-Oppheimer and Dvir (2013) chose and studied three narratives written by first year teachers that had been submitted for an Israeli story writing contest in order to compare, contrast, make sense of, and learn from the stories told by first year teachers. Shatz-Oppheimer and Dvir paid particular attention to how the narratives revealed the self-perceived professional identities of the authors and what experiences contributed to the development of these identities.
- James (2015) analyzed the narratives of two teacher who left the profession after their first year of teaching and then returned two years later. James’ goal was to

first gain insights into how the experiences of first year teachers contribute to and shape their personal and professional identities and then to explore how their experiences led them to leaving and then returning to the profession.

- Yong and Hoffman (2014) used narrative research to give voice to eight Hawaiian teachers that had engaged in a Hawaiian immersion language program. The narratives were able to provide insight into how the teachers were motivated by a commitment to their students and a passion for preserving their native culture. The narratives also revealed that teachers viewed the technology that was used in the program as a significant support that helped them to be successful.

Here I reference just three of an exhaustive list of possible examples that demonstrate that narrative research is an accepted and useful tool that uses the stories of participants to gain insight, develop new understandings, and inform future practice and research.

An Interpretive Framework Using Hermeneutical Philosophy

“Interpretive research, which is where qualitative research is most often located, assumes that reality is socially constructed, that is, there is no single, observable reality” (Merriam, 2009, p. 8). An interpretive framework understands that each person builds his or her own reality based on experiences and how he or she perceives and makes meaning of those experiences (Merriam, 2009; Rubin & Rubin, 2005). The interpretive researcher expects people to experience slightly different events and perceive those events differently causing them to construct their own personal reality. Therefore, it is possible that two entirely different realities can both be true (Rubin & Rubin, 2005). In this study, I explored not only the experiences of elementary teachers as they relate to mathematics instruction; I also studied how they perceived

their experiences. I studied the lenses that shape the perceptions of each teacher, and built an understanding of why those lenses exist (Rubin & Rubin, 2005).

The majority of data collected in this study came from in-person, recorded interviews. Following the interview, each participant was given the opportunity to read a summary of the data and craft written responses and additions to contribute to the data gathered. As a result, a portion of the analysis consisted of the interpretation of written texts in order to make meaning and develop understanding, i.e., hermeneutics (Merriam, 2009; Rickman, 1981). According to Merriam and Tisdell (2016), hermeneutics is the study and interpretation of written text with a special attention to the context and meaning behind what is written. Hermeneutical interpretation of text takes into account the context of when and how the text was written in order to develop an understanding of what the author wanted to communicate and the intended meaning of the text produced (Merriam, 2009; Merriam & Tisdell, 2016; Rickman, 1981). The study and interpretation of the written teacher responses informed and guided the development of the narratives in this study (Merriam, 2009).

Research Design

This study consisted of the development of three separate narratives depicting the stories of elementary teachers as they have engaged in mathematics throughout their career. There were three participants in the study, all of which are teachers at the same elementary school in Northern California. This particular elementary school implements a departmental model in which each teacher involved in departmentalization teaches a subject combination of only mathematics and science or English and history. All three of the participants in this study have taught math and science in the departmental model, although only two of the participants teach math and science currently (see Table 1). The other participant has transitioned to teaching

English and history this school year for reasons that will be outlined in the presentation of data. Two of the participants in the study are female teachers and one is a male. The participants each have over 20 years of teaching experience and each taught in a traditional single classroom model for the majority of their career before transitioning to the departmental structure. This dual experience provides a unique perspective perfect for comparative analysis. The participants have experience teaching different grades in a departmental model. One teacher has only taught 4th grade math and science in a departmental model. The other two teachers have experience in both 5th and 6th grade departmentalization. The range of experiences for each participant allowed for comparative analysis of the impact of departmentalization on each grade level.

Table 1

List of Participants

Teacher Name	Grade Level Taught	Subjects Taught
Fred Brann	4 th	Math & Science
Sarah Miller	6 th	ELA & Social Science
Amy Bradley	6 th	Math & Science

The elementary school in this case study exists within a large urban school district in Northern California. For the purpose of anonymity, I refer to the school by the pseudonym Isaac Newton Elementary School. Isaac Newton was the first elementary school in the district to implement a departmental model and is currently one of only a few in the district to do so across

three grade levels. The transition to departmentalization began in the 2010 – 2011 school year and was initially only implemented at fifth grade (personal communication, April 13, 2017). Isaac Newton serves approximately 550 elementary students. Roughly 240 of those students are in grades fourth through sixth. A comparison of the primary demographic data of Isaac Newton Elementary School with that of the school district and the state of California can be seen in Table 1 ("Demographics - Data & Statistics (CA Dept of Education)," n.d.). It would be nearly impossible to identify an elementary school implementing departmentalization that had identical demographics to that of the entire state. Acknowledging that there are some significant differences between the demographics of Isaac Newton Elementary School and those of the state of California, they are not so dissimilar as to inhibit reasonable comparisons.

Table 2: Demographic data for Isaac Newton Elementary, the school district, and the state of California for the 2015 – 2016 school year

Group	Percent of Total Enrollment (Isaac Newton)	Percent of Total Enrollment (School District)	Percent of Total Enrollment (California)
Black of African American	12%	15%	6%
Asian	7%	9%	9%
Hispanic or Latino	32%	39%	54%
White	39%	18%	24%
Two or More Races	9%	6%	3%
Socioeconomically Disadvantaged	54%	66%	n/a
English Learners	9%	18%	n/a
Students with Disabilities	12%	12%	n/a
Foster Youth	1%	1%	n/a

*Areas labeled as "n/a" were not available on the California Department of Education website.

In order to initiate contact with the participants for this study, I began by reaching out through email to the principal of Isaac Newton Elementary School. The email consisted of a brief introduction of who I am and the focus of this study. I explained that I was looking to connect with the three teachers described above. I asked that, with the permission of the teacher, the principal would provide me with contact information for any teacher who may be interested. The principal responded within a week. He had talked to the three teachers and they all gave permission for him to give me their contact information. I then reached out to each teacher through email confirm that they are teaching or have taught math. I also explained that, if they agreed to participate, I would request an in person interview at the location of their choice that would last approximately 30 to 45 minutes. All three participants agreed and we scheduled a time and location for each initial interview to take place. At the end of each interview, I explained that I would take some time to transcribe and summarize the interview. I then sent each summary to the appropriate participant and asked them to review the summary, make any corrections they saw, and add any information, opinions, and thoughts that they felt would contribute to the study. All three participants knew that they were permitted to remove themselves from the study at any point if they saw the need to do so.

It was of paramount importance that the participants felt safe and secure throughout this study as this is the only way that they would be open and transparent in their interviews and reflections (Berkowitz, 1989). I made it known to all participants that nothing from this study would be shared with anyone without the use pseudonyms in order to protect the anonymity of all parties involved including: teachers, administrators, students, schools, and districts. In order to ensure participants that there would be no possible repercussions for anything said during the study, I did not have any communication regarding the study with any district staff or school

administrators beyond the initial email requesting information about potential participants. I did however make it clear to the participants that I will send the final copy of this dissertation to all interested parties for the purpose of building understanding and informing practice. Upon completion, I shared each narrative with the associated participants and provided them with the opportunity to ask questions, or raise concerns. All participants knew that they could cease to participate in the study at any time without any repercussion.

Challenges I Encountered and the Implications for Study Design

Initially, I encountered significant challenges in finding participants for my study because of the burdens inherent in my original methodological approach. I initially planned to work with the participants for a twelve-week period. I planned to conduct three separate interviews with each participant. In addition, I asked each participant to compose a weekly video, audio, or written reflective journal. Although, the teachers were interested in participating in the study, they each expressed that the time commitment that I was proposing was far too burdensome. They all respectfully declined my original invitation to participate and I was forced to reconsider the structure of my study. Teachers are extremely busy and they expend a lot of the energy and personal capital in their classrooms on a daily basis. It is my strong recommendation that any researcher that plans to work educators take this into account when designing their study. The researcher should look for opportunities and structures that allow them to gather the greatest amount of data while imposing the smallest burden on the educator possible. If the researcher is interested in a study design that requires greater involvement by the participants, I recommend identifying a methodological approach that is mutually beneficial and creates value for the participants. Participatory research is one such methodological approach that should be considered.

In the initial design of this study, I planned to work with the teachers over a twelve-week period and take an active role in the experiences of the participants. I hoped to work collaboratively with the teachers to plan math lessons, review student work, and possibly even co-teach lessons. Ultimately, because I am an administrator at another school, there were not opportunities for us to work together on a regular basis. My study design changed to an interview and follow up structure and there were not opportunities for participatory research. I do however believe that future research on departmentalization in elementary schools could use this approach effectively. The researcher could embrace the study as an opportunity to work collaboratively with the participants to achieve collective growth and mutual benefit (Goins, Garrouette, Fox, Dee Geiger, & Manson, 2011; Lau & Stille, 2014). This could take the form of collectively working to implement departmentalization for the first time in a school or it could involve the researcher working collaboratively with a set of teachers to improve existing structures in a way that has a positive impact on teacher self-efficacy. This type of participatory research could potentially reduce the perceived burden on the teacher as they are directly benefitting from their participation in the study. The data from a participatory study could then potentially be presented as an action research study or as an autoethnography.

Collection of Data

To increase participation and the quality of the data collected, it is important to design a method of data collection that is as accommodating, comfortable, and as safe as possible for the participants (Berkowitz, 1989). Data must be received consistently and in a form that is coherent in order to increase ease and reliability of data analysis (Berkowitz, 1989). For these reasons, I chose in-person interviews to be the primary vehicle by which I collected data for this study. However, it is important to acknowledge that this was not my original proposal for data

collection. In the original design for this study, I proposed a series of three interviews and weekly process journals over a ten-week period. I emailed each of the teachers in early September of 2017 explaining the study and asking them to participate. Each potential participant responded within two weeks and stated that they would not be able to participate in the study. They made it clear though a series of emails that they were interested in participating, but the original study design would be far too burdensome. The teachers explained that they were already extremely busy in their daily professional practice and that although they wanted to contribute to the study, they would not be able to do so unless the structure was altered. When this happened, I reached out to my dissertation chair to reflect and make appropriate adjustments to the design. We decided collaboratively that I would be able to gather sufficient and valuable data through a single interview with each participant and a structure for asking follow up and clarifying questions. I then reached out to the teachers through email again in October of the same year. I explained the alterations that had been made to the data collection process and all three teachers agreed that this approach was far less burdensome. Each teacher agreed to participate and we scheduled the interviews to take place in November and December.

Ultimately, this adjustment proved to be beneficial. Under the original design, I would have focused on gathering data to form a narrative for a twelve-week period. This narrative would have provided a snapshot of the teacher's experiences over a limited time frame, but likely would have failed to capture the narrative of their career holistically. When the adjustments were made, the participants were instead able to present an overarching narrative of their entire career during the interview. They each talked about their journey toward departmentalization and the factors that contributed to their willingness to embrace this alternative structure. They each compared and contrasted their experiences in the departmental structure with those in the

traditional single classroom structure. The data that resulted from these interviews presents a clear picture of the perceptions each participant has in regard to elementary school structure, the benefits and detriments of departmentalization, and the aspects of implementation that they deem to be most critical for success.

All interviews conducted were semi-structured as this style of interview marries well with narrative inquiry (Chase, 2005; Merriam & Tisdell, 2016). A semi-structured interview is one that asks a variety of open-ended and more focused questions. This format allows the interviewer to respond to what is happening and ask the appropriate questions to gather the data they are seeking (Merriam & Tisdell, 2016). The data gathered during an interview is only as good as the questions that are asked (Merriam & Tisdell, 2016) and in narrative inquiry, the questions that are asked directly impact the narrative that is told (Chase, 2005). In interviewing for a narrative inquiry, the interviewer must be prepared to invite a story and then ask follow up questions to gain clarity and extension when necessary (Chase, 2005). Because the nature of storytelling is unpredictable, it may not be possible to be fully prepared with all of the appropriately planned out questions. The interviewer must listen actively and ask questions at the appropriate time (Chase, 2005).

In this study, each participant agreed to engage in a single interview that lasted between 30 and 45 minutes. They were able to choose a location that was convenient and comfortable for them. One participant chose to meet at a coffee shop on a Saturday morning. The other two decided to meet in their classrooms at Isaac Newton Elementary School. Mr. Brann wanted to meet before school and Mrs. Bradley decided to meet after school had dismissed. I recorded each interview with the consent of the participants and took notes for reference on a notepad. The majority of notes were on observations of tone and my impressions. Apart from the in-

person interviews, all communication that took place between the participants and I was done through email as the participants said that this mode of communication was the most convenient for them.

Wolcott (1994) identifies three ways to gather data: observing (experiencing), interviewing (enquiring), and studying materials prepared by others (examination). It is important that I acknowledge that I am only using one source of data collection in this study, enquiring. I understand that this creates the risk of reducing trustworthiness of data (Bowen, 2009; Mathison, 1988). I address this by utilizing member checking and multiple participants to triangulate the data and improve the trustworthiness of my findings (Hallett, 2012; Merriam & Tisdell, 2016). Member checking in this study takes place on two separate occasions and was used to both gather and confirm data. Upon completion of each interview, I transcribed the interview and composed a five to ten page summary of the interview. I then sent each summary to the appropriate participant for review. Participants were able to add comments, make adjustments to statements, and ask for material to be admitted if they did not feel it was appropriate or accurate. Both Mrs. Bradley and Mr. Brann provided a lot of feedback at this stage in the process. Mr. Brann provided additional commentary that added insight to some of his statements and he emphasized other statements that he felt were important. Both of these participants also used this opportunity to self-edit their statements. Mrs. Bradley asked that one statement be removed because she worried that it sounded too cocky. Mr. Brann expressed that he felt his “unscientific, biased opinions should be edited if possible.” He felt that they seemed “silly and irrelevant.” This feedback became part of the data collection process that ultimately informed the composition of each participant’s narrative and identified themes. Once a draft was composed for the presentation of data for each participant, I presented each participant with the

opportunity to read and critique the section that I had written depicting their experiences. The presentation of a summary, and in this case a narrative, allows for the participants to focus on the content holistically without being distracted and possibly embarrassed by grammatical structures and mistakes that are often present in verbatim transcripts (Hallett, 2012). There was very little feedback at the part of the data collection process. I took the feedback they did give into consideration and made adjustments to the narrative as I deemed appropriate. Therefore, the formation and presentation of data for each participant was a collaborative endeavor in which the researcher and participant worked together to present an accurate and informative depiction of the data.

Data Analysis

There were dual and complimentary purposes for this study. The composition of the three narratives provided broad insight into the experiences and self-efficacy of the elementary teachers in this departmental structure which was then be compared to the related research associated with the traditional single classroom model. In addition, I used the data collected from the interviews to conduct a thematic case study analysis of the departmental structure of the school as a whole. I comparatively cross analyzed the experiences and perceptions of each of the participants in order to identify themes that may guide future research, policy, and practice (Merriam, 2009). In order to do this, I implemented a consistent, continuous, yet flexible plan for data analysis (Berkowitz, 1989; Miles & Huberman, 1994). After each interview, I composed an outline of the narrative for each participant. As themes developed, I identified those and organized all associated data before writing a brief summary for each theme. When there were common or contrasting themes that developed for more than one participant, I noted those and included these findings in my data analysis. The identification of themes helped me to

develop meaning that ultimately informed my findings and recommendations (Boeije, 2002; Miles & Huberman, 1994).

Miles and Huberman (1994) recommend starting the data analysis portion of a qualitative study with a list of predetermined codes that can be modified, removed, or added to as necessary. Codes are labels assigned to words, sentences, phrases, etc., that have similar meaning. Content with the same code can then be clustered together and these clusters can be used to identify themes and meaning (Boeije, 2002; Miles & Huberman, 1994). For the purpose of this study, I began with the following categories for coding the data that I receive in the participants' journals: professional learning, growth, frustration, success, collaboration, student related, peer related, systems related, administration related, content related, anxiety, confidence, expertise, efficacy, perceived self-efficacy, failure, social, family, significant quotes, questions I have, questions participants have, need, positive experience, and negative experience. These were vague and widely encompassing codes and I found that I added and refined codes based on the data that emerged in the interviews (Berkowitz, 1989; Miles & Huberman, 1994).

Presentation of Data

Story telling is the most natural way in which humans describe experiences, convey emotions, and portray perspectives (Gubrium & Riessman, 2001; Jones, Torres, & Arminio, 2014; Seidman, 2006; Schatz-Oppenheimer & Dvir, 2013). Stories are not only an interesting way to present findings; they often elicit empathy and provide a unique insight into the lives, experiences, and constructed realities and identities of participants (Grace, 2011; Gubrium & Riessman, 2001; Schatz-Oppenheimer, & Dvir, 2013). For these reasons, I chose to present the data gathered in this study as three unique narratives depicting the experiences of each participant related to math instruction throughout their career. Because the teachers are at the

same school and have shared experiences, components of the narratives are interrelated, but I chose to compose one distinct narrative for each participant. Each narrative consists of a beginning, middle, and end (Merriam, 2009), but the flow of each narrative was uniquely formed to best portray the story of each participant as it is the job of the narrator to organize disorganized data in a way that provides the greatest connection and insight for the reader (Gubrium & Riessman, 2001; Jones, Torres, & Arminio, 2014).

It was my responsibility to compose the narratives of each participant and it was therefore necessary that I used sound methods and techniques to ensure that each story was credible, reliable, transferable, dependable, and confirmable (Flick, 2009; Lincoln & Guba, 1986). I was careful to focus initially on each participant separately when analyzing data and composing the narratives. Upon completion of each interview, I transcribed the audio that had been recorded on my iPhone. After all transcriptions were complete, I focused on each interview separately. I organized the data into two categories; sequential data for the narrative and data that could be organized into themes. Often data fit into both categories and was organized as such. As I analyzed and organized the data, I maintained recorded separate notes and reminders for each participant which included reflective comments about tone, emerging themes, questions I have, and anything else that stood out (Miles & Huberman, 1994). I wanted each narrative to be unique and stand alone and if I did not approach them separately, I would have risked becoming confused and blending the narratives as I composed them.

Although positionality of the narrator is unavoidable and a welcome part of narrative based research, I wanted to ensure that I challenged the thoughts that I was developing about each story along the way. Jones, Torres, and Arminio (2014) warn of the danger of telling the story that you want tell rather than the real story that develops. To combat this, throughout the

data gathering and analysis process, I looked for evidence to counter the thoughts that I had and the themes that I believed were developing. In order to increase transferability, each narrative was written to include what Lincoln and Guba (1986) describe as “thick descriptive data” (p. 77) that provides enough information and description that the reader is able to develop understanding, make meaning, and draw conclusions as they see fit. Once the narratives had been completed, I presented each participant with the opportunity to read and respond to the narrative specific to them (Krefting, 1991; Lincoln & Guba, 1986). I took all feedback they provided into account and made revisions that I felt were appropriate.

A Framework for Presenting a Narrative

Each narrative presented is composed of the four critical components as laid out by Clandinin and Connelly (1989): experience, time, personal knowledge, and reflection and deliberation. Although all four of these components play a key role in the development of a narrative, it is experience that provides the primary body of the narrative. To study education is to study experience (Clandinin & Connelly, 1989) and narrative inquiry is the study of experience in story form (Schaefer, Downey, & Clandinin, 2014). It is the job of the narrator to incorporate all relevant experiences of the participant, both the unique and significant and the expected and less interesting, to develop a story that is presented comprehensively in a way that represents the holistic nature of life experience (Clandinin & Connelly, 1989).

Time is a key structural building block of narrative as all experience has a past, present, and future. Past experience impacts present perception and each experience alters future anticipation and expectation (Clandinin & Connelly, 1989). It is the job of the narrator to provide context to the story that helps the reader to make sense of the present experiences of the participant in light of past experience and future expectation. However, there is no prescribed

format for presenting experience in the context of time. It is the responsibility of the researcher to decide how far to look into the participant's past and how far to project into the participant's future (Clandinin & Connelly, 1989). It is important to note that although narrative does incorporate chronology, narrative differs from a chronology in that it incorporates the narrator's point of view and the participant's "emotions, thoughts, and interpretations" (Chase, 2005, p. 656), not just a set of events (Chase, 2005). Clandinin and Connelly (1989) differentiate the component of reflection and deliberation in the composition of a narrative, but I choose to incorporate this component into time as reflection refers to the consideration of past events and deliberation accounts for the perceptions and expectations in relation to the future.

Clandinin and Connelly (1989) identify personal knowledge as the third component of narrative. Personal knowledge includes all that contributes to personal reality and perspective. Personal knowledge develops as a result of past experience and social and cultural realities, all of which contribute to the way a person constructs their view of self and experience (Chase, 2005). Narrative researches consider all aspects of a person's life as important components and influencers of the narrative (Chase, 2005). It is equally important that the narrator accounts for their own personal knowledge as this influences the way the narrative is shaped and presented. In this process, the narratives of the participant and the researcher are unavoidably intertwined as each is considering experiences and constructing reality through the lens of their own personal knowledge (Chase, 2005).

Conclusion

Although there is research to support that departmentalization at the elementary level can have a positive impact on the academic achievement of students, there is a lack of research that seeks to compare the experiences, perceptions, and constructed realities of the teachers in a

departmental structure with what the research already says about teacher math perception in the traditional elementary single classroom model. In this qualitative case study, I utilized narrative inquiry as my methodological approach to study and understand, through the stories of three participants, not only what each teacher has experienced, but why they are had these experiences and how they are interpreted them. I gathered data from the interviews and written feedback of three elementary teachers in a school with an established departmental structure. From this data, I composed three individual narratives. These narratives present us with the opportunity to learn from the stories of each teacher and gain understanding that will inform the school structures, supports, and professional development opportunities for teachers in elementary schools throughout the nation.

Chapter 4: Presentation of Data

In this qualitative case study, I explored the lived experiences of three different elementary teachers at a single school in Northern California. This school has been implementing a departmental structure in select grade levels since the fall semester of 2010. In this structure, teachers teach either mathematics and science, or they teach English and social studies. All the three teachers in this study have experience teaching mathematics and science in the departmental model although one of the teachers is currently teaching English and social studies. Each teacher in this study has over 20 years of teaching experience and multiple years of experience teaching in a departmentalized structure at Isaac Newton Elementary School. One teacher is currently teaching fourth grade mathematics and science. The other two teachers are partners at the sixth grade level. One teaches mathematics and science and the other teachers English and social studies.

The data in this study was gathered in a two tier process. Each participant was initially interviewed for approximately 35 to 45 minutes. Each interview was held in person at a location chosen by the participant. The interviews were recorded on an iPhone and later transcribed into a word document. After transcription, I composed a summary of each interview. Each summary consisted of a narrative of the career and experiences of the participant and the themes that emerged during the interview. Once each summary was complete, it was sent to the participant for review. Each participant was asked to make corrections, to build upon existing data, and to contribute any other experiences, ideas, or opinions that they felt would increase understanding of the impact of departmentalization on their practice and self-efficacy. Each participant then sent the summary, with their contributions, back to me for review and analysis.

In this chapter I present the individual narrative of each participant. Each narrative will consist of a description of the participant's career prior to departmentalization and their experiences within the departmental structure at Isaac Newton Elementary. I incorporate any dynamics of the interview that contribute to the overall narrative of the participant. Dynamics include, but are not limited to, tone, non-verbal communications, and my personal perceptions. At the end of each narrative, I highlight key themes that emerged during the data gathering process for each participant. The purpose of this study was to explore the impact of departmentalization on teacher satisfaction and self-efficacy. All data were analyzed in the following chapter in order to address the research question: How does a departmental structure influence the experiences, perceptions, and self-efficacy of elementary teachers as each relates to mathematics instruction?

Fred Brann's Journey into Departmentalization

My interview with Mr. Brann took place on a cold, December, weekday morning at 7:00 AM. Mr. Brann chose to meet in his fourth grade classroom at Isaac Newton Elementary School. It was immediately evident that Mr. Brann had his guard up slightly. He spoke with a seemingly intentional, deliberate pace of speech that allowed him to choose his words cautiously. Initially in the interview, Mr. Brann's answers were very brief and he was hesitant to expand his answers and speak freely. It felt as if he was assessing my intentions and the validity of my study. He spoke of quantitative studies that he was aware of and the validity of those results. He repeatedly placed value on "scientific" research and often downplayed the validity and importance of his personal opinions, thoughts, and criticisms. After reading the summary of his interview, he described one critical comment that he made about district level decision making as "editorializing in excess." He also closed his feedback by saying that his "unscientific, biased

opinions should be edited if possible,” because “they seem silly and irrelevant.” In spite of his predispositions and initially apprehensive approach to the interview, Mr. Brann began to open up as the interview progressed. He ultimately provided insight that is valuable and illuminating in trying to understand the impact of departmentalization on the self-efficacy of an elementary school teacher.

The fact that Mr. Brann has developed strong opinions and views about research should not come as a surprise. He has been around academics and research for his entire life. Mr. Brann was raised by “academics and educators.” Mr. Brann’s mother was a historian and earned doctorates in both history and English. Mr. Brann’s father was a biologist and encouraged Mr. Brann to study and explore science in the real world. I sensed both a pride and fondness of memory Mr. Brann explained that he grew up on a small farm and spent a lot of his childhood in the nearby woods exploring and falling in love with science. He credits much of his interest in education and lifelong learning to the values that his parents instilled in him at a young age. This desire for continual growth and learning has served as the foundation for Mr. Brann’s professional career as an educator. This is evidenced by his willingness to teach a wide variety of subjects, to embrace and work within alternative school structures, and to participate in collaborative learning experiences that exist beyond the school walls and take place outside of school hours.

Mr. Brann began his career as an educator over 30 years ago. He initially started in the classroom as a long term substitute teacher before accepting a job as a full time teacher in an alternative school. This school was designed to support first through third grade students that had recently immigrated to the United States and were English language learners. In order to teach at this school, Mr. Brann earned a language development certification. He also has a minor

in Spanish and describes himself as “fairly fluent.” His fluency in Spanish was only minimally helpful as there were a wide variety of native languages spoken by the students at this school for English learners. One year, Mr. Brann recalled, “there were a total of eleven different native languages” represented in his classroom. Mr. Brann chose to highlight the advantages of the singular focus of language development for the entire class population. He explained that differentiating for English language development for one student in his current class of primarily native English speakers is far more challenging than what he experienced in this school designed for English language development. Mr. Brann really enjoyed his time teaching at this school. He described it as a “blast,” and he felt that the program was effective in supporting that student population. After three years, Mr. Brann’s time at the school came to an unfortunate end when the school was closed and the program was abandoned. Mr. Brann openly expressed his feelings of frustration and questioned the motivation behind the closing of the school. Mr. Brann acknowledges that there were likely a multitude of reasons for the school closure, but he also expressed that too often, decisions that greatly impact the lives of kids are made for financial reasons rather than what is best for the students.

After the closure of the language development school, Mr. Brann transitioned to another school within the same district. This school included kindergarten through eighth grade. His first teaching assignment at this school was either a 2nd/3rd split or a 3rd/4th split. He explained that it has been a very long time since this assignment and that he can no longer recall which grades he began with. After teaching the split for a short time, Mr. Brann settled in as a fourth grade teacher at the school for several years. In general, this elementary school implemented a traditional, single classroom structure, but it was there that Mr. Brann began to experiment with elements of specialization. During his tenure as a fourth grade teacher at the school, there were

several years where Mr. Brann and partner teachers implemented what he termed as “student exchanges.” In these exchanges, Mr. Brann would teach science to his class and then again to another class of fourth grade students. While he was teaching the other group of students, his class would be with another teacher that taught them social science. Mr. Brann did not engage in this model every year, but he did do it multiple different years with multiple teaching partners.

Student exchanges were not a common practice in that school or the district at that time, yet as he talked about this practice, Mr. Brann did not present it as novel or innovative. He was not bragging or trying to present himself as a pioneer of departmentalization. Instead, it came across in his tone and description as something that was simply logical and best for his teaching practice and the learning of his students. Ultimately, it was during this time that he began to recognize benefits of specialization. Mr. Brann especially enjoyed the opportunity to teach a single lesson twice. This allowed him to reflect upon and improve his instruction. It also meant that all of the cumbersome prep work (and he emphasized how cumbersome this can be) involved for a major science lab or project wasn’t done for only one lesson. He was able to repeat the learning experience with a second group of students and it made the prep work seem more reasonable.

Next, Mr. Brann had the opportunity to experience a true departmental structure as a secondary teacher at the same school. He taught in the seventh and eighth grade program at the same school. In this role, Mr. Brann primarily taught history, but he also taught ceramics, physical education, and Spanish as part of an extra-curricular enrichment program. Mr. Brann explains that it was this experience in secondary education that made his eventual transition to departmentalization at Isaac Newton seem less novel. He described it as removing the “fear of the unknown.” Mr. Brann also enjoyed the empowerment and freedom that he experienced as a

single subject matter teacher. He explains that secondary teachers are respected as content experts. He sees this as a respect that is not often afforded to elementary teachers in traditional single classroom structures. At this point in the interview, I noted that this was a point of emphasis for Mr. Brann. He comes across as a confident professional with high self-efficacy. He greatly values being respected as a content and instructional expert and although he didn't say it directly, it seemed to me that he is frustrated by what he perceives to be a lack of trust and respect for elementary teachers in general.

Approximately six years ago, Mr. Brann was again part of a program closure that forced him into transition. The middle school program at the school was discontinued and his position therefore no longer existed. It was at this point that Mr. Brann took a position at Isaac Newton Elementary School. Mr. Brann's first assignment was as a teacher in a 4th/5th grade split class. Although departmentalization already existed in pockets at Isaac Newton, the split classes were all still taught using the single classroom structure. Mr. Brann does not pull any punches when talking about the "split" classroom structure. A split classroom is one in which one teacher teaches two separate grade levels, in the same classroom, for the entire year. Mr. Brann views this as a fundamentally flawed structure and he did not hide his disdain. To illustrate his point, Mr. Brann asked me to imagine how challenging it would be to teach both seventh and eighth grade math in the same classroom, to the same kids, at the same time, with the same expectations for student learning and achievement. He then pointed out that elementary teachers in split classrooms are asked to not only do this for math, but also for English, history, and science. Mr. Brann explained that it is inevitable and tragic that this creates a dynamic in which "supportive interactions decline exponentially." He explained that this is just another example where

decisions about educating students are made based on financial reasons rather than what is best for kids.

Fortunately, Mr. Brann only had to teach the split class for one year. He then transitioned to teaching fourth grade and has been teaching at this grade level ever since. Mr. Brann immediately partnered with the other fourth grade teacher to implement a student exchange that mirrored that which he had done at his previous school. Once again, Mr. Brann taught the more involved science lessons and his partner teacher taught social science. This partnership was forged completely independent of administrative pressure and was done because he and the other teacher saw this student exchange as mutually beneficial for both students and teachers. Mr. Brann again enjoyed the opportunity to prep and set up for lessons and learning experiences that he was able to repeat and refine. He also explained that he feels that it is “healthy and beneficial for students to be exposed to different environments and teachers.”

Mr. Brann’s partner teacher in the student exchange retired and a teacher that was already at Isaac Newton Elementary transitioned into the open fourth grade position. At this point, departmentalization already existed in the fifth and sixth grades. Mr. Brann explained that others had “pioneered” this structure at the school and it appeared to be a positive and beneficial structure. As he talked about the teachers that began departmentalization at Isaac Newton, I perceived that he greatly respected them and their willingness to take that risk and try something new. I also got the impression that he would have been willing to do the same thing if he had been there when it began. Because of his experience with student exchanges and secondary education, the departmental model did not intimidate Mr. Brann. He did not see it as strange or “novel.”

Mr. Brann and his partner teacher had several informal conversations about the possibility of implementing a departmental structure at the fourth grade and ultimately, with the blessing and guidance of administration, they decided to do it. They decided that Mr. Brann would teach math and science and his partner teacher would focus on English and social science. This decision was made based on each teacher's comfort level with the subjects. Although Mr. Brann does not have a math or science degree, he has a lot of experience in these fields and feels very comfortable teaching both. Mr. Brann explained that he is especially interested in and excited about the "constructivism and tenants of learning that now make up the science and engineering and math practices." Although Mr. Brann enjoyed teaching English and social science in the past, he does not miss it. He explained that he is plenty busy with what he is teaching now and that that is enough "fuel for the fire." He also explained that "the nice thing about the math practices and the science and engineering practices is that there are those cross cutting concepts and ways to include lots of rich language development and explain figurative language."

Mr. Brann's Comparison of the Single Classroom Model and Departmentalization

During the interview, I perceived that Mr. Brann's self-efficacy and self-identity are directly tied to his professional identity and the success of his students. Mr. Brann made it clear throughout the interview that he is passionate about maximizing the learning of all students and he is dedicated to continuously improving his instruction and practice in order to do so. Mr. Brann explained that he is able to do this much more effectively in a departmental structure. He repeatedly explained that the departmental structure allows him to teach subject matter that he is confident and comfortable teaching. He is able to "immerse himself more deeply into the math content" which allows him to "make connections between conceptual strands." He has "time to

plan how to best teach the content to support students in making sense of what they are learning.” Mr. Brann made it clear that he was not able to accomplish this same level of preparedness when in the single classroom structure. “The load associated with teaching four subjects in the traditional model limits the depth of preparation for teaching math concepts.”

Mr. Brann views math and science as subjects in which teacher expertise is especially critical for student learning and conceptual understanding. These subjects are uniquely complex and “there is a greater responsibility to have a deeper understanding of the content.” According to Mr. Brann, departmentalization allows for this specialization that optimizes the teacher’s ability to “negotiate the different ways that students make sense of and communicate their understanding of math concepts.” Mr. Brann stated that in a departmental structure, “I feel I can concentrate my energies and thinking in math and science as I prepare lessons and units better than I would if I were preparing for a broader set of curricular goals and objectives.”

Mr. Brann talked a lot about the math anxiety and the lack of confidence that he sees in many of his students. He explained that he appreciates the opportunity to impact the math perceptions and learning of 60 students instead of only 30. Mr. Brann works hard to create a “safe classroom environment to support students in overcoming math anxiety and fear.” He looks to develop a culture defined by the mathematical growth mindset championed by Joe Boaler in which students and teachers embrace mistakes as deep and positive learning experiences. Mr. Brann explained that because he is able to carve out more time to make sense of the math content himself, he is able to better guide students through their own learning journey. He talked about the importance of understanding that “everyone is on their own learning schedule and departmentalization allows the teacher to be less rigid about pacing and better able to support the students where they are at.”

Teacher Empowerment and the Importance of Administrative Support in a Departmental Structure

Mr. Brann does not measure his success by the opinions of and the accolades from administrators. He has a defiant pride in his tone as he explained that his professional success is measured by the success of his students and he takes this responsibility very seriously. Mr. Brann pointed out in the interview that the students in his class “will make it very clear if (he) is doing a good job or not.” That being said, Mr. Brann clearly appreciates being valued and respected as a professional educator and subject matter expert. He praised his current administrator for holding himself and the teachers at the school to high expectations. Mr. Brann said of the current principal, “He demands a lot from teachers in terms of rigor and is not shy about sharing concerns where they arise, but there is support to go with those high expectations. The administrator supports teachers in a way that allows them to take risks and be flexible in order to meet the diverse needs of students.” Mr. Brann followed up in his post-interview feedback by saying, “I can’t emphasize enough how important administrative support is and how strong our current administrator’s leadership has been in encouraging teachers to seek best practices, take risks, and maintain a growth mindset.”

Mr. Brann perceives the implementation of a departmental structure at Isaac Newton Elementary School as evidence that the current principal trusts the teachers at the school. Mr. Brann stated that “the departmental model demonstrates to teachers that they are valued professionally and trusted to be content and instructional experts.” He compared the message sent to departmental elementary teachers to that of the trust instilled in high school single subject teachers and he emphasized that this “trust is critical” in supporting and empowering teachers. Mr. Brann explained that this trust increases teacher self-efficacy and motivation and this

directly impacts how teachers then interact with their students. The trust is transferred to the students in the classroom. Mr. Brann explained that teachers “begin to trust their students to explore the mathematics and make sense of what they are learning in their own way.” He claimed that “if a teacher is trusted to try new things, they are more likely to trust the students with freedom to explore and experiment as well.”

Collaborative Practice

Mr. Brann appreciates the opportunity to work collaboratively with colleagues and values the opportunity to learn from each other and improve professionally. He talked about formal and informal lesson studies that they have done in the past at Isaac Newton and how valuable it was for teachers to “engage in productive and academic dialogue with colleagues.” He explained that this has the potential to “then translate to providing opportunities for the same types of academic conversation experiences for students.”

In spite of his positive views on collaborative experiences, Mr. Brann and his current partner teacher collaborate fairly infrequently. He explained that he and his partner do not often have the opportunity to meet and engage in “substantive discourse on how what (they) do might overlap and integrate.” Mr. Brann wanted to make it clear that he was not trying to be negative about his current teaching partnership. He explained, “Even if we don’t meet frequently, the communication is positive and constructive.” Mr. Brann also explained that he does see the great potential for collaboration in the departmental structure and “anticipates greater thematic collaboration” between his partner and himself in the future. Mr. Brann did express that because prep time is so limited at the elementary school level, finding time for collaboration can be challenging. He explained that supports and incentives would likely be helpful in promoting collaborative practices.

Sarah Miller

Sarah Miller was the first to reply to my request for an interview and was immediately engaged and willing to participate in the research study. At Mrs. Miller's request, we agreed to meet at a busy local coffee shop on a brisk, but sunny Saturday morning. Mrs. Miller greeted me with a big smile and conveyed a disposition that I interpreted as open and transparent. She has a jovial demeanor that caused me to feel relaxed immediately. At the same time, Mrs. Miller came across as confident and comfortable in her own professional skin. The only time she displayed any hesitation or put up a guard during the interview was when Mrs. Miller was talking about past schools, colleagues, and teaching partners. In such instances, she made a point to avoid making any negative or disparaging comments and asked that I respect that she did not want to not talk about other schools or people. Other than this, Mrs. Miller was completely open in describing her experiences, perspectives, thoughts, and opinions.

Mrs. Miller began her career as a speech therapy assistant after graduating from a California State University with a degree in speech pathology and audiology. Her first positions were at non-public schools and various centers for students that were developmentally disabled. She was not shy in stating her feelings about these positions. She hated them because she found that she did not have the opportunity to make the impactful connections and develop the relationships with kids that originally drew her to education. After a very tough year in which she took over for a teacher that quit almost immediately, Mrs. Miller knew what her next step would have to be. She enrolled in a teaching internship program that allowed her to earn her multiple subjects teaching credential while gaining classroom teaching experience at the same time.

Mrs. Miller's tone and energy completely changed at this point in the interview. She again became upbeat and excited as she talked about her first position as an independent classroom teacher. She began as a first grade teacher at a school that is in the same district as Isaac Newton Elementary. This elementary school is located in a low socioeconomic neighborhood and approximately 70 percent of the students are identified as English Language Learners. In contrast to the school transitions that are typical and often experienced by most teachers early in their career, Mrs. Miller remained at this elementary school for a total of 20 years. After her first year, Mrs. Miller transitioned from first grade to fifth grade and remained there for 17 years. This elementary school utilized the traditional single classroom structure as did all schools in the district at the time. Eventually, Mrs. Miller had a couple of tough fifth grade classes in a row and when a first grade position opened, she decided to return to that grade level. She fell in love with teaching again. She found that "it wasn't so complicated." She was no longer dealing with difficult behavioral issues. Instead, she was "dealing with loose shoe laces," and she "could get their attention by singing." In our interview, Mrs. Miller reflected on this time with a smile and exhaled, "They just loved me!"

Although she did love teaching the first grade students, unexpectedly, a situation presented itself that led Mrs. Miller back to the fifth grade. A teacher, who had previously taught at that elementary school, was returning to the classroom after several years as an English instructional coach in the district. The only opening at that time was in the fifth grade and this teacher expressed apprehension about teaching fifth grade math. She had been out of the classroom and focused on only English for quite a while. This coupled with uncomfortable disposition towards mathematics to start with, created quite a bit of anxiety. Mrs. Miller recognized her hesitation and proposed a departmental structure that, to her knowledge, did not

yet exist anywhere else in the district. Mrs. Miller offered to teach fifth grade math and science so that the other teacher could focus on English Language Arts and history. The teacher agreed and Mrs. Miller began to teach in a departmental structure for the first time in her career.

Departmentalization sounded great in theory at the time, and Mrs. Miller really did enjoy the opportunity to narrow her focus while teaching only math and science. Her experiences in the model even served as the catalyst that motivated a teaching friend of hers at Isaac Newton Elementary to ultimately suggest the implementation of departmentalization in their fifth grade program. As she talked about this, she conveyed a sense of pride in being was a co-innovator of the departmental structure. That being said, there were some unanticipated dynamics of the departmental structure that diminished Mrs. Miller's experiences in that first year. Mrs. Miller had not realized the importance of a strong and well-matched teaching partnership. Although Mrs. Miller made it clear that she does like and respect her first teaching partner, it was also clear that they had very different styles and approaches to teaching. As a result, dynamics existed that made collegial conversations and collaboration extremely challenging at times. She was also bothered by the way her partner teacher treated their shared students. She felt that the other teacher "did not treat them kindly." Ultimately, it was clear after one year that that particular teacher partnership was not working and Mrs. Miller decided to return to a traditional single classroom structure for her remaining three years at that school before transitioning to Isaac Newton Elementary.

In her first year at Isaac Newton, Mrs. Miller faced an entirely new challenge. Her first assignment was as a single classroom teacher for a fifth and sixth grade split class. Much like Mr. Brann, Mrs. Miller sees the split classroom structure as ineffective and unreasonably challenging. She too expressed unapologetic disdain for this structure. She stated that "the

amount of differentiation needed to effectively teach two grade levels simultaneously is extremely significant and the time it takes to appropriately plan split lessons for all subjects is absolutely unreasonable.” Despite the challenges and frustrations associated with the split class in her first year, Mrs. Miller found that the change to Isaac Newton placed her in an environment that was much more positive for her. There was a sense of relief and delight in her voice as she explained that the teachers at Isaac Newton “were much more excited about teaching, the Common Core, collaboration, trying new things, and there was a high level of overall teacher buy-in on campus.” Mrs. Miller found herself around “like-minded colleagues and this was refreshing.”

For the remainder of the interview, as she talked about her time at Isaac Newton, Mrs. Miller conveyed a strong self-confidence and sense of purpose that was different than when she spoke of her previous school. At the time of her transition, Isaac Newton had already been utilizing pockets of departmentalization for approximately three years. Although Mrs. Miller did not participate in this structure in her first year, she did transition into a departmental structure in her second year. At that time, she taught math and science to two different groups of students. One group was entirely made up of fifth graders, and the other group included both fifth and sixth grade students. The split aspect of this situation still presented a significant challenge, but Mrs. Miller did enjoy the opportunity to again focus on only two subjects. She also had an entirely new positive experience with departmentalization. She found herself in a teaching partnership with a teacher that she “very much respected” and worked well with. Mrs. Miller found that teaching in synchronization with her partner teacher made the departmental structure much more successful and enjoyable. This was a point that she emphasized throughout the interview.

It was ultimately the retirement of this partner teacher that led to the transition that Mrs. Miller made this year. She is now teaching sixth grade English and social studies. She made the decision to transfer to sixth grade for several reasons. The first is that her partner teacher retired and she knew that if she stayed in fifth grade, she would be partnered with a new and more novice teacher whom she did not know. She just “didn’t love the idea of partnering with a fresh teacher.” And although she enjoyed the opportunity to focus on math and science, Mrs. Miller found that she also missed teaching language arts. In her new role as the sixth grade English and history teacher, she is partnered with an amazing teacher that she already knew and respected, she is able to again teach language arts (a subject that she really enjoys), and she was able to teach the same group of students that she taught the previous year in fifth grade. She felt a responsibility to ensure that these received a high quality language arts learning experience in sixth grade since she knew that they had been taught by her excellent teaching partner in fifth grade.

Mrs. Miller made it clear that she does not regret her decision to transfer to the sixth grade this year at all. In fact, she said that she “could not identify any negatives associated with her experiences this year.” Mrs. Miller has a “very strong and close teaching partnership this year.” When she spoke about her partner teacher during the interview, it was always with a smile and exuberance. It was as if she was talking about family member or close personal plan. They share a combined classroom separated by only a retractable accordion door. This could create a potential problematic situation if the partner teachers did not get along well, but instead, Mrs. Miller and her partner teacher use this space to their advantage. They commonly open the retractable wall to address the class jointly, to allow the students to transition, for their frequent

collaborative planning sessions, and for when they cohost parent events such as back to school night and open house.

The Dynamics of a Teaching Partnership

Throughout the interview, Mrs. Miller continuously emphasized that the dynamics of teaching partnerships are critical in the departmental model. It is these dynamics that have most impacted her satisfaction in the different experiences with departmentalization. Mrs. Miller compared the teaching partnership to marriage. She called the relationship “spouse-like” and stated that teaching partners need to “be able to communicate openly and work together to support all of the students they share.” Mrs. Miller explained that there is a “shared responsibility and ownership of the achievement of students in all subjects.” She didn’t isolate her measure of success to the achievement of the students in the specific subjects that she taught. Rather, she expressed a shared responsibility for the achievement of students in all subjects.

Mrs. Miller also talked about how her feelings about her partner teacher impacted the way she felt about sharing students. When she was with a partner teacher that had a teaching style and demeanor with the students that she did not see as positive, she had a really hard time sharing her students. She felt bad when students would express that they didn’t want to go to the other teacher’s classroom and she struggled to remain unified with a teacher that she often didn’t agree with. In that situation, she felt that it was ultimately better to revert back to the single classroom structure so that she would have complete autonomy with her students and could avoid the negative partner dynamics.

Mrs. Miller expressed that she feels completely different about sharing students in a departmental structure when she trusts, respects, and works well with her teacher partner. She explained that she sees a great benefit for the students and teachers when both teachers are strong

and treat the students well. Mrs. Miller explained that the students are able to focus more when they are able to switch classes in the middle of the day and experience instruction from a different teacher. She stated, “If a student is challenging, I may be able to connect with them and keep them focused for half of a day whereas it would be much more difficult to keep them focused, engaged, and on track for the entire day.” Mrs. Miller also believed that switching teachers helps to prepare the students for middle school where they switch teachers throughout the day. She explained that this can be a “bumpy transition for kids.”

Subject Specialization and Teacher Self-Efficacy

Mrs. Miller repeatedly talked about the benefits departmentalization in regards to subject expertise and instructional improvement. She explained that “departmentalization allows teachers to align with their greatest strength and avoid teaching subjects that they don’t feel as comfortable with.” According to Mrs. Miller, “There are many elementary teachers that don’t feel comfortable even with fifth grade math content.” She talked about how at her previous school, where they utilize the traditional single classroom model, many teachers “had a fear of math and said that math was not their thing.” She contrasted this with the environment at Isaac Newton where she stated that she does not hear comments like that. She attributed the difference to the content knowledge and confidence of the teachers that are teaching math in the departmental structure. Mrs. Miller explained that “departmentalization creates the opportunity to really focus on how to best teach math concepts.”

In addition to content expertise, Mrs. Miller explained that the departmental structure creates a greater opportunity for instructional improvement. She talked about the benefit of being able to teach a single lesson twice in the same day. “This allows the teacher to learn from the first delivery of the lesson, make adjustments, and improve. This reflective practice is not a

luxury that elementary teachers in the single classroom model are able to experience and benefit from.” In addition, teachers are able to focus on planning lessons that meet the expectations of the new Common Core State Standards for math and the Next Generation Standards for science. She explained that the transition to these standards was much more manageable because she was able to focus in on each subject and plan lessons to best meet the new expectations. Mrs. Miller stated, “If I was teaching all four subjects, I would not have the time it takes to customize lessons and learning experiences.”

There is one aspect of departmentalization that Mrs. Miller identified as negatively impacting teacher expertise and professional growth. Mrs. Miller explained that “collaboration is difficult to structure because there isn’t more than one teacher teaching any identical grade and subject combinations.” The teachers are able to collaborate with their partner teachers, but this isn’t often content specific as they teach different subjects. They can also collaborate with the other departmental teachers that are focusing on math and science, but these teachers are at different grade levels. The ability to co-plan and co-reflect on identical lessons is very limited. Mrs. Miller expressed her strong desire to learn and grow professionally through collaborate practice, but explained that it can often feel as though she is teaching “on an island” in the departmental structure.

Implementing Departmentalization at Isaac Newton

Mrs. Miller made it clear that any major change, such as the implementation of a departmental structure, must have teacher buy-in and should not be forced. Departmentalization at Isaac Newton has thrived because the teachers that are using this model chose to do so because they saw the benefits of the departmental structure. The Principal supported the teachers in their transition, but he has never mandated that a teacher uses the departmental structure. The

teachers implementing this structure are completely on board. Ultimately, other teachers see the benefits of the structure and begin to buy-in as well. This is how departmentalization is expanding and Isaac Newton. In fact, departmentalization at Isaac Newton is no longer limited to grades four through six. The teaching partners in the first grade are open to implementing this structure and are currently in their first year of attempting to departmentalize.

Amy Bradley

Amy Bradley agreed to meet with me in her classroom and a Thursday afternoon. As I walked through the door, Mrs. Bradley was laughing and talking with two colleagues as they finished up an afterschool meeting. Despite it being the end of the day, she had a tremendous amount of energy that was contagious. Mrs. Bradley carried herself with a strong air of self-confidence and she spoke with an intensity that grabbed my attention, but never made me feel intimidated or uncomfortable. She was brash, but always in a jovial sort of way and we laughed and shared perspectives throughout the interview. Mrs. Bradley is opinionated and often spoke off the cuff during our interview and her honesty was both insightful and refreshing. There was a controlled chaos that existed during the interview of Mrs. Bradley that was in many ways the antithesis of what I experience when meeting with Mr. Brann. Although her demeanor was very different than Mr. Brann, she offered an equally valuable perspective on departmentalization and elementary education as a whole.

Like the two teachers chronicled above, Amy Bradley is a well-experienced veteran teacher. Mrs. Bradley graduated from UC Davis with a degree in early childhood development. She originally planned to teach preschool, but immediately realized that the earnings potential in preschool education was relatively low and decided to teach elementary school instead. Since this decision, Mrs. Bradley has gone on to teach for a total of 32 years, all within the same

Northern California school district. It was early in her career that Mrs. Bradley learned the importance of working in a school and with an administration that is the right fit for her. She began her career as a first grade teacher in an elementary school in which she experienced administrative turnover within the first year. The original principal became sick and was forced to step down half-way through the year. Mrs. Bradley and the principal that followed did not get along well at all. Their difficult relationship included circumstances that led to Mrs. Bradley filing grievances on three separate occasions. She felt that the new principal was looking to fire her and decided that her best move was to self-surplus and look for an opportunity to work at a different school.

Mrs. Bradley was hired to teach first grade at a different elementary school the following year, but immediately found herself at odds with her new principal as well. At this point in the interview, Mrs. Bradley smirked and said, "I was kind of outspoken as a young person." Mrs. Bradley's relationship with this principal became so contentious that she ultimately decided to move Mrs. Bradley from first to fourth grade "out of spite." At first, Mrs. Bradley was extremely uncomfortable with the imminent transition to a higher grade level. She explained, "I was like, you can't do that. I can't even write in cursive!" Despite her apprehension, and to her surprise, by the end of her first day teaching fourth grade, she was in love with the change. She found that the older students were able to focus and participate in learning experiences for longer periods of time and she found this to be enjoyably different.

Mrs. Bradley eventually went on to teach at the first, third, fourth, fifth, and sixth grade levels and she built a solid reputation within the district. As a result, Mrs. Bradley was hired as a mentor teacher within the district and focused on helping other teachers with classroom management. In this role, Mrs. Bradley was able to enjoy a funny twist of fate. Her original

principal, the one that wanted to fire her, requested mentor help for some of her teachers that were struggling with classroom management. Mrs. Bradley was assigned to support her original school and in many ways, this was a validating experience. It was clear as she told me this story that she still basked in what was clearly a self-reassuring and confidence-evoking experience for her.

In 1991, Mrs. Bradley's journey brought her to Isaac Newton Elementary School and she has been there ever since. When she first arrived there, and for nearly two decades, Isaac Newton had the same traditional school structure as every other elementary school in the district. Students remained in a single classroom for the majority of the day and each teacher taught all four of the core primary subjects. This seemed to be working fine and Mrs. Bradley felt competent and confident in her practice. The only variation to this structure that Mrs. Bradley experienced was the self-imposed integration of GATE and non-GATE students. At the time, all GATE identified students were taught by one teacher in one class and the non-GATE students were taught by a different teacher in a different classroom. Mrs. Bradley and her grade level colleague at the time saw value in integrating the students for some subjects and therefore arranged customized student swaps between themselves. This allowed students to get to know each other and learn from new and different student perspectives. She explained that she enjoyed this structure, but does not agree with the current approach of full integration of GATE students that is now taking place at the school.

About ten years ago, two fifth grade teachers at Isaac Newton began to get lazy. Well, not really, but that was Mrs. Bradley's originally impression when the two teachers decided to implement a departmental structure at the fifth grade level in which one teacher focused on math and science and the other teacher focused on language arts and social studies. She knew that

both teachers were pretty skilled teachers, but Mrs. Bradley was skeptical about the motivation behind the move to departmentalize. She viewed this approach as “lazy teaching and thought it was more of a benefit to the teacher than the students.” Mrs. Bradley has seen a multitude of shifts in education throughout her career and is not easily swayed or convinced by new fads and trends. At the time, she thought that departmentalization at the elementary level would be no different.

Mrs. Bradley acknowledges now that she was wrong. She and her colleagues at Isaac Newton began to see the benefits of departmentalization and were soon intrigued by the prospect of implementing this structure at other grade levels. They recognized “that there was value in departmentalization because the teacher was able to plan for only two subjects and really hone their craft.” Despite her realization and acknowledgment of the potential benefits of departmentalization, there was still one aspect of this structure that made Mrs. Bradley hesitant to implement it at the sixth grade. She was nervous about the dynamics between herself and her would-be sixth grade teaching partner. She knew that they had very different teaching styles and that she did not always agree with this teacher’s instructional strategies. In her interview, Mrs. Bradley explained that if she had “had the chance to partner with the fifth grade language arts teacher at the time, she would have jumped at the opportunity.” Unfortunately, this was not an option and Mrs. Bradley had to decide if she was willing to take the risk of partnering with the other sixth grade teacher at that time. Eventually, despite her reservations, Mrs. Bradley decided that she would engage in the partnership and expand the departmental structure at Isaac Newton to the sixth grade. Mrs. Bradley would teach math and science and her partner teacher would teach language arts and history.

Mrs. Bradley found that her reservations were not unfounded. Her and her partner teacher had very different styles and often didn't agree, but they were able to make it work and remained teaching partners for three years. Mrs. Bradley explained that she did not always agree with her teaching strategies, but she recognized that she needed to place her trust in this teacher to teach Language Arts and history well. She made it clear that trust was the key to a healthy teaching partnership. The partnership ultimately became healthy enough that the two teachers collaborated to make adjustments to the departmental structure to best meet the needs of their students. For example, Mrs. Bradley and her partner teacher realized that they both taught their second lesson of the day better than the first because they were able to reflect and improve upon what they had already done. They saw this as inequitable for the students that consistently received the lessons first. They decided that it would be beneficial to develop a schedule in which the starting subjects for the student groups would rotate periodically. This adjustment made it so a student would start with math and science one week, but would then rotate to instead start with English and social science the following week.

Last year, Mrs. Bradley's teaching partner retired and it was at this time that Sarah Miller transitioned into the sixth grade English and social studies role. Mrs. Miller and Mrs. Bradley are currently partner teachers. Mrs. Bradley explains that this has proven to be a very positive and mutually beneficial teaching partnership. Whereas in her previous partnership, Mrs. Bradley felt that she was often looking to push and motivate her partner to innovate and try new things, in this partnership, Mrs. Bradley and Mrs. Miller are mutually motivating each other to improve and innovate. They have a mutual drive to embrace the changes and challenges associated with Common Core and they are constantly searching for way to improve how they are implementing and utilizing the departmental structure. The teachers share a sliding wall and often push the

wall back to co-address the two classes, to co-teach, to hold collaborative parent events, and to host collaborative teacher meetings. It is clear that Mrs. Bradley is enjoying the dynamics of this new teaching partnership and her positive energy and enthusiasm was both obvious and infectious during the interview.

This year, Mrs. Bradley has transitioned from a one-time skeptic of departmentalization to a teacher leader on her campus. The first grade teachers at Isaac Newton are attempting to implement a departmental structure for the first time this year and often look to Mrs. Bradley for advice and guidance. She is happy to help them in the transition as they navigate the small, yet unanticipated intricacies of this move. They call her with questions about practice, curriculum, and even day to day logistics such as how to navigate picture day when you have the other teacher's roster of students in your class. In working with the first grade teachers, Mrs. Bradley makes it a point to consistently remind them that "there is a lot of figuring it out that takes place in the first year of implementing departmentalization. It is a learning process."

The Benefits of the Departmental Model

Although Mrs. Bradley was initially hesitant to explore and embrace departmentalization, she is now a firm believer that her inclusion in this model has made her "a stronger teacher." She attributes this to the opportunity to focus on fewer subjects and persist in becoming an expert teacher of the content that she does teach. She states, "I mean, this is the thing that I really love, that you can hone in on your craft. You can really delve deep. You can really learn more. When you're teaching so many subjects, you can't be good at all of them." She is able to build a deep understanding of the content she is teaching and is therefore able to deliver instruction that allows students to access that content conceptually. She is far more confident in her own instructional practice.

Mrs. Bradley talked specifically about how this structure has allowed her to take on the challenges associated with the shift to common core. She explains that for many teachers, Common core took traditional elementary curriculum and instruction and “flipped it on its’ head.” She continued, “Curriculum is limited, very open-ended, and not prescriptive at all. It was a major shift that caused a lot of stress for many elementary teachers.” In contrast to the majority of teachers, Mrs. Bradley was able to spend significant time developing an understanding of the new standards and exploring various curriculums including Engage NY, Envision, and a district created curriculum map. This time for extended and deeper preparation ultimately increased Mrs. Bradley’s confidence in her ability to deliver the sixth grade math Common Core standards effectively. The same is proving true as she now learns and implements the Next Generation Science Standards.

In addition to focused learning and planning opportunities, Mrs. Bradley identified repetition as a major factor in increasing her overall confidence and efficacy. She first talked about how beneficial it is to teach the same lesson twice in the same day. She explained, “Teachers are able to learn from teaching a lesson more than once. They teach the lesson in the morning, realize changes that need to be made, make those adjustments, and then deliver a much improved lesson the second time.” Mrs. Bradley also talked about the learning that takes place from year to year because she is able to spend more time reflecting, learning, and revising her instructional approach. She and Mrs. Miller each separately referenced teaching the division of fractions using a bar model as an example of something that they initially struggled with, but have now mastered due to consistent teaching, reflecting, collaborating, and planning. Mrs. Bradley is currently working through how to best balance conceptual and exploratory learning

with the development of necessary procedural fluency. She explained that she would not have the time to reflect and plan at this level if she was teaching all four subjects.

Teaching Partnerships in Departmentalization

Mrs. Bradley spoke again and again about the importance a strong teaching partnership when implementing a departmental structure. She explained that it was her apprehension about a teaching partnership that contributed to her initial hesitation to try departmentalization. Mrs. Bradley's apprehension proved to be valid. Although her original partnership lasted for three years, Mrs. Bradley often did not agree with her partner's instructional strategies and she was tasked with pushing her partner teacher to innovate and embrace the expectations of the new Common Core State Standards. Mrs. Bradley has since had the opposite experience in working with her current partner. They collaborate and push each other to be better at their practice. It is clear that she is much more satisfied with the departmental model because of the positive nature of the current teaching partnership.

On several occasions throughout the interview, Mrs. Bradley reiterated that "trust is vital in the teaching partnerships that exist in departmentalization." She stated, "If you trust your partner, it can be a great thing, but if not, departmentalization can be a negative experience. You have to be able to place your trust in the partner teacher, even when their teaching style and approach might be different than your own. Although you teach different subjects, you share responsibility for the achievement of the students." Mrs. Bradley acknowledges that she and her partner do not always agree, but she makes it clear that they trust each other. It is this trust that serves as the foundation for a very positive and professionally enriching partner relationship. Mrs. Bradley and her partner share the same desire to see their students succeed and they are

united in their effort and commitment to ensure that they work together to help each student achieve that success.

Conclusion

In this case study, three teachers from Isaac Newton Elementary School were interviewed for the purpose of understanding the impact of departmentalization on their lived experiences and teacher self-efficacy. They each had unique journeys that led them to Isaac Newton and to their willingness to embrace and implement a departmental structure at their respective elementary grade level. They each described unique experiences and individual perceptions, opinions, and thoughts about departmentalization. In the next chapter, I analyze and synthesize the data that have been presented in order to make meaning, draw conclusions, and put forth recommendations for implementation and future research.

Chapter 5: Analysis of Data, Conclusions, and Recommendations

Few careers in the United States have as significant an impact on the success and future of young Americans as that of an elementary school teacher. It is therefore logical to identify school structures and practices that support elementary teachers and provide them with greatest opportunity to succeed. One factor that has a significant impact on teacher success and student achievement in elementary mathematics is teacher professional math self-efficacy (Bandura, 1993; Chang, 2015; Gresham, 2009). Teacher math self-efficacy is increased when teachers enjoy content expertise (Ball & Bass, 2000; Nurlu, 2015; Zaya, Kwalat, & Attach, 2016), impactful professional learning opportunities (Chang, 2015; Miller, 2010; Wilson, 2014), focused and collaborative planning sessions (Chang, 2015; Miller, 2010), and a low-stress workload and environment (Gresham, 2009). The purpose of this qualitative case study is to understand how the implementation of a departmental school structure at a particular elementary school has impacted all of these factors and ultimately the overall self-efficacy of the teachers on campus. I conducted in-person interviews with three elementary teachers working within a departmentalized structure at the same school in hopes of answering the following research question: how does a departmental structure influence the experiences, perceptions, and self-efficacy of elementary teachers as each relates to mathematics instruction? In this chapter, I analyze how the data collected in this study addresses the research question. I use this analysis to draw conclusions where possible and make recommendations for future practice and research.

Teacher Math Self-Efficacy at Isaac Newton Elementary School

Each of the three teachers in this study repeatedly described aspects of the departmental structure that allow them to grow in their instructional practice, experience high job satisfaction,

and enjoy elevated professional self-efficacy. One of the elements that stood out as a major positive for each of the teachers was their ability to specialize in subject matter that they felt competent and comfortable teaching. All three teachers expressed that they felt confident in their ability to teach all four of the primary subjects, but that they really enjoyed, and saw value in the ability to specialize in math and science. Mrs. Miller explained that “departmentalization allows teachers to teach subjects that align with their greatest strengths.” Mr. Brann expressed that this is particularly important with math because of the “complexities of the subject.”

According to Mr. Brann, “There is a greater responsibility to have a deeper understanding of the content” in math because that expertise in mathematics allows the teacher to “better negotiate the different ways that students make sense of and communicate their understanding of math concepts.” This is critical in helping students to develop the deep conceptual understanding of mathematics that is expected under the Common Core State Standards.

Interestingly enough, although all three teachers felt confident in teaching math, none of them had extensive math backgrounds. None of the three teachers majored in mathematics or a science related field and all three spent much of the early parts of their careers in the primary grade levels of elementary education. So why did they feel equipped and prepared to teach elementary mathematics in a departmental model in grades four through six? It is because these three teachers are not afraid of the conceptual elements of the mathematics. They do not experience the math anxiety experienced by many of their colleagues. Mrs. Miller talked extensively about the overwhelming math anxiety expressed by many of her colleagues at the school prior to her tenure at Isaac Newton. She stated that many of the teachers “didn’t feel comfortable with even fifth grade math content.” They “had a fear of math” and often stated that “math was not their thing.” She further explained that “these fears and feelings about math

transfer to students,” and that it is “important that the teacher is confident in teaching math.” Mrs. Miller explained that she does not hear about teacher math anxiety at Isaac Newton and she attributes that to the departmental structure and the ability for teachers to specialize in content areas of strength and confidence.

In addition to their own pre-existing self-confidence in their ability to deliver math instruction, the implantation of the departmental structure at Isaac Newton conveys that administration has a high level of trust in the mathematical expertise of these teachers. This stood out as especially important to Mr. Brann. He explained that the “the departmental model demonstrates to teachers that they are valued professionally and trusted to be content and instructional experts.” He compares it to the message sent to secondary teachers. They are viewed and trusted as content experts on campus. This trust “increases teacher motivation,” and “translates to how teachers then interact with students.” He stated that “they begin to trust their students to explore the mathematics and make sense of what they are learning in their own way. If the teacher is trusted to try new things, they are more likely to trust the students with the freedom to explore and experiment as well.” In her own way, Mrs. Bradley conveyed the same message when talking about why she decided to specialize in math and science. She knew that she was confident in the subject matter, but joked that she probably choose math because she thought that she could possibly do it better than any other teacher would. She wanted to make it clear that she wasn’t disparaging any other teachers, but it does demonstrate that departmentalization provides the opportunity for a more confident teacher to deliver math instruction and a less confident teacher to avoid it.

One of the most prominent and reoccurring themes that developed during all three interviews was that the departmental structure provides the opportunity for teachers to focus on

fewer content areas when planning and engaging in professional learning. As a result, overall mathematical content and instructional self-efficacy is increased. Mrs. Bradley stated this clearly when she said, “This is the thing that I still really love, that you can hone your craft. You can really delve deep. You can really learn more. When you’re teaching so many subjects, you can’t be good at all of them.” Mr. Brann added to this sentiment when he stated, “I feel that I can concentrate my energies and thinking in math and sciences as I prepare lessons and units more than I could if I were preparing for a broader set of curricular goals and objectives.”

All of the teachers expressed that that ability to teach a lesson more than once during a day greatly contributed to perceived professional growth in instructional practice. This in turn, increases teacher instructional math self-efficacy. Mrs. Bradley stated, “Teachers are able to learn from teaching a lesson more than once. They teach the lesson in the morning, realize changes that need to be made, make those adjustments, and then deliver a much improved and more effective lesson the second time.” Mrs. Miller made an almost identical statement and added, “This reflective practice is not a luxury that elementary teachers in the traditional single classroom model are able to experience and benefit from. In the traditional model, the best teachers can do is take notes and make adjustments the following year.” Each of these teachers clearly valued the opportunity to learn in real time and make adjustments for the lessons to follow. They are so confident that their instruction improves during the second delivery that some of the teachers even developed a rotation system for student schedules. The students spend a prescribed number of weeks receiving math instruction in the morning and then rotate to receiving math instruction in the afternoon instead. The teachers have developed this system to avoid potential inequities in access to the higher quality math instruction that exists upon reflection and instructional adjustments.

In addition to experiencing professional instructional growth on a lesson by lesson basis, each of the teachers expressed that their professional math self-efficacy is increased because they are able to concentrate their focus on expanding their mathematical content knowledge and understanding. This has been particularly important during the past few years as the teachers have looked to implement the new Common Core State Standards for mathematics. Mrs. Bradley talked about how the expectations and instructional approaches for elementary mathematics education were dramatically altered under these new standards. She explained that this caused a lot of stress for many of the elementary teachers that she knows at other schools. In contrast, all three teachers explained that they were able to dive deep and really learn standards because of the narrowed focus in the departmental structure. They all expressed that they would not have been able to do so if they were still in the traditional single classroom model and were expected to teach all four subjects. They were each able to embrace the new standards, take the time to learn and understand them, and have enjoyed positive experiences and professional growth as a result.

The teachers talked about their ability to identify and understand the conceptual connections that exist throughout elementary mathematics and how they are therefore now able to help students identify and make sense of those connections as well. Mr. Brann talked throughout his interview about his exploration of the math standards of practice outlined in the new Common Core State Standards. He explained that because he is able to carve out more time to make sense of the math content and expectations himself, he is able to better guide students through the learning process. He specifically talked about his preparedness to embrace student mistakes and guide students as they use those mistakes to develop a deeper and more meaningful understanding of the content and concepts. He stated that “a growth based learning environment is critical for learning in mathematics.”

Mrs. Bradley and Mrs. Miller also talked about the opportunities for continuous focused learning and growth through mistakes. They focused specifically on their ability to learn from their own trials and errors when exploring how to best teach the Common Core math standards. They each specifically talked about the use of models to represent and teach the division of fractions. This can be a complicated and confusing approach for teachers at first, but it is an expectation of Common Core standards and therefore, Mrs. Bradley and Mrs. Miller were committed to mastering this instructional technique. For two straight years they came together and explored how the models worked and collaborated about how to best deliver the instruction to their students. This year, Mrs. Bradley's third year of teaching using these models, she expressed that she finally has it mastered. As a result, they students did remarkably well with the content and were able to use the models to demonstrate their understanding on a deep conceptual level. She laughed as she explained that the students gave her a hard time because they could not understand why she ever found the models to be confusing or difficult in the first place. This is just one example of how the departmental structure has provided the opportunity for these teachers to focus on mathematical learning and preparation, grow in their professional and instructional practice, and increase their overall math self-efficacy.

Although the teachers did clearly express that they have more time to focus on building their personal mathematical conceptual understanding in the departmental structure, they also each spoke about how difficult it can be to find opportunities to effectively collaborate in this model. At Isaac Newton, there is no circumstance where any two teachers are teaching the exact same subjects and grade level at the same time. Mrs. Bradley, Mrs. Miller, and Mr. Brann are all able to collaborate with their partner teachers and they enjoy these opportunities, but because they teach different subject matter, the impact of this collaboration is limited. They explained

that they can collaborate about math vertically, but time for this collaboration is limited and the opportunities are rare. Each teacher expressed how much they would enjoy having a colleague to discuss grade specific mathematics content and instructional strategies with. This would build their conceptual understanding and another perspective would encourage greater professional growth.

Finally, one of the most significant impacts of the departmental structure expressed by each of these teachers was a reduction in overall stress and workload and an increase in job satisfaction. For Mr. Brann, the stress reduction stemmed from the need to only plan for and prepare two lessons each day. He explained that he still works extremely hard, but he especially appreciates that when he spends significant time setting up for a learning experience, he is able to use that preparation for two lessons instead of just one. Mrs. Bradley and Mrs. Miller both talked about how the limited duration of time that they spend with each group of students has improved their overall relationships with those students that can be challenging. Both teachers find that they experience less fatigue with individual students than they did when they had the same students in their class for almost the entire day. As a result, student centered stress is reduced and overall job satisfaction is improved. Mrs. Bradley and Mrs. Miller also spoke to the ability to collaboratively approach school events and parent communication. They explained that having a unified partner provides support that reduces anxiety in situations that can be stressful and overwhelming when done in isolation.

Trust and Choice

As the narratives for each participant developed, and themes emerged, it became clear that the intertwined dynamics of trust and choice were foundational for the expansion and success of departmentalization at Isaac Newton Elementary School. These two concepts are

interconnected as choice and autonomy only exist in an organization where the members are trusted and respected. The participants in this study made it clear that at Isaac Newton Elementary, the administration makes a concerted effort to empower and support teachers as they explore and implement the departmental structure. The teachers are encouraged to be innovative and take risks. The administration does not place constraints on the teachers or attempt to force compliance to a particular structure or method. Instead, teachers are respected as content and instructional experts that can be trusted to experiment, explore, make mistakes, learn, grow, and ultimately provide the best possible learning experience for the students that are in their classes. It was clear in all three interviews that the trust instilled in the teachers by the administration is both motivating and empowering.

This theme of trust and choice also emerged on a collegial level in the dynamics of the partner teacher relationship. Inherent in a departmental structure is a shared responsibility for the success and achievement of students. In contrast to the single classroom model where a teacher has complete control of the learning experiences of their students, in the departmental structure, there is a partner teacher that also impacts student experiences and achievement. The participants in this study each explained that they had to be able to trust their partner teacher to do what is best for the kids. Mrs. Bradley and Mr. Brann explained that they may not always agree with what their partner teacher is doing, but they need to trust their decisions and respect their instructional and professional autonomy. All three participants explained that it is important that teachers are able to choose partner teachers that they trust and can work well with. Absent of this trust, the teaching partnership will be unhealthy and unsustainable. Mrs. Miller spoke of a situation when she removed herself from a teaching partnership due to a lack of trust and shared vision and Mrs. Bradley explained that she would never have attempted to implement

departmentalization if not for the opportunity to work a colleague that she already trusted and respected.

The final tier of trust and choice exists in the relationship between teacher and student. Mr. Brann explained that the trust demonstrated by the school administration provides a model for how the teachers on campus should interact with their students. He explained that because he is permitted to take risks and make mistakes, he is more apt to provide his students with that same trust. All three teachers talked about the importance of exploration, sense making, and freedom to make mistakes in the learning process. Because they feel empowered as professionals, they are then more likely to transfer this trust and look to empower their students as learners. They have more time to plan explorative learning experiences and they have the content expertise to help students navigate the productive struggle that is critical for deep and impactful learning. Ultimately, trust permeates the entire school organization and becomes the foundation for administration, teacher, and student exploration, learning, and growth.

Reengaging with the Literature: Confirmations, Challenges, and Contributions

The results of this study supported and confirmed much of the body of research presented in chapter two. The most prominent confirmation existed in each participant's claim that because they are able to teach a subject of expertise and focus their preparation, they are a better and more confident teacher in the departmental structure than they were in the single classroom model. The participants each explained that they felt confident teaching mathematics and spoke about their ability to help students develop conceptual connections with the mathematics they were learning. Powell, Fuchs, and Fuchs (2018) and Wilson (2014) each talked about the importance of mathematical conceptual knowledge and understanding. They claimed that teacher content knowledge was critical when helping students link key concepts and make sense

of the math they are learning. Ball and Bass (2000) explain that a teacher does not necessarily need to be a high level mathematician in order to teach elementary mathematics, but they must be competent and confident in exposing underlying math concepts and helping students develop connections. The three teachers in this study fit well with the prototype of Ball and Bass as none of them had advanced math backgrounds, but all expressed a confidence that impacted their instructional practice. Each teacher confirmed throughout their interview that subject matter expertise does have a significant impact on teacher self-efficacy in relation to mathematics instruction.

Akay and Boz (2010), NURLU (2015), Wilson (2014), and Gresham (2009) each talk about the role of high teacher math self-efficacy in increasing instructional innovation and professional teacher perseverance. Mrs. Bradley and Mrs. Miller each exhibited this perseverance as they worked together year after year to master the modeling of dividing fractions. Neither teacher was inhibited by math anxiety or feelings of inadequacy. They were therefore willing and able to continue to learn and take risks that ultimately led to increased understanding for their students. All three of the teachers in this study also talked about their ability to differentiate their math instruction for the purpose of meeting the needs of all of the students in their class. They are willing to persevere even when this becomes challenging and frustrating. Akay and Boz (2010) explain that this perseverance is the result of a positive perspective on mathematics. They explain that “teachers with high self-efficacy regard low achievers as accessible and their learning problems as solvable” (p. 62). Because all three teachers in this study possess high math self-efficacy, they share this perspective and are committed to teaching and supporting all students of all levels in their classrooms.

This study also confirmed both positives and negatives of collaborative teaching partnerships in a departmental structure. Mrs. Bradley and Mrs. Miller supported the conjecture of Hood (2010) when he explained that departmentalization would provide a partner for thought, workload, parent conferences, and more. Mrs. Bradley and Mrs. Miller each expressed that they very much enjoyed the opportunity to hold joint conferences and parent centered events. Mr. Brann also spoke of the importance of having a unified vision for student success and a united front when working with parents. Although each participant clearly valued the teacher partnerships in the departmental structure, they also agreed with Lobdell and Van Ness (1963) whom explained that collaboration in an elementary with departmentalization would be difficult to facilitate. The teachers explained throughout the study that collaboration is challenging because there are no other teachers that teach the same grade level and subjects that they teach. The collaboration that does happen is therefore not often content and grade specific. Collaboration is most valuable when it relates directly with the content and instruction that is happening in the classroom on a daily basis (Garet, Porter, Desimone, Birman, & Yoon, 2001). The participant explained that opportunities for this type of valuable and relevant collaboration are missing in the departmental structure at Isaac Newton. They each expressed a desire for more opportunities to collaborate with colleagues teaching exactly what they are teaching.

Just as collaboration is most impactful when it is relevant, professional learning is also most beneficial when it happens in real time, is job embedded, and connects to the content the teacher is teaching at that time (Garet, Porter, Desimone, Birman, & Yoon, 2001; Wayne, Yoon, Zhu, Cronen, & Garet, 2008). There is no rule that says that professional development needs to be led by an administrator or outside consultant. The teachers at Isaac Newton have used the departmental structure as an opportunity to engage in self-professional development and they are

experiencing increased self-efficacy as a result. All three participants in this study explained that they are able to explore content more deeply and make relevant conceptual connections because they now have the time and capacity to do so. They also explained that they are able to grow on a daily basis from what they learn from their initial experiences when teaching a lesson. Each day, the teachers are able to teach a lesson once, reflect upon how it went, and then make adjustments to their instruction for the next class. This represents a cycle of continuous improvement in which content expertise and instructional practice grow and overall teacher self-efficacy is impacted.

Diffusion of Innovation

The implementation and expansion of departmentalization at Isaac Newton Elementary school aligns well with the theory of diffusion of innovation laid out by Frank, Zhao, and Borman (2004). These authors explained that innovation should happen as a process on a continuum and not as a wide sweeping change throughout an educational organization all at once. They explain that initial innovators should be those with high expertise, confidence, and social capital. At Isaac Newton, the initial teachers to experiment with departmentalization were well respected teachers with experience and a willingness to take risks. Although none of the participants in this study were the initial innovators at Isaac Newton, they were all veteran teachers with high self-efficacy and social capital on campus. The combination of experience and high self-efficacy increased their willingness to take risks and innovate. Two of the participants had experimented with some form of departmentalization or student exchanges prior to embracing full departmentalization at Isaac Newton. After seeing the success of departmentalization for the original fifth grade team, the participants in this study saw the

benefits of this structure and were willing to embrace the innovation as early adopters. They have since become experts and resource providers on campus.

The initial innovators serve to pilot innovation and their success motivates others in the organization to embrace the innovation as well. As the innovation expands, the original innovators and early adopters become the resource providers as they are able to offer guidance and advice to new adopters (Frank, Zhao, & Borman, 2004). Mrs. Bradley talked about how this has proven true at Isaac Newton Elementary. As the teachers have seen the success and benefits of the departmental structure, other grade levels have looked to embrace and implement this structure. The first grade teachers are in their initial year of implementation and they look to the more experienced teachers, including Mrs. Bradley, for advice. She explained that she is able to answer their questions, provide advice, and offer encouragement as they go through their own journey of innovation.

Challenging the Current Body of Research

In 1984, Ball and Lacey claimed that departmental structures create professional and social pressure to assimilate. They claimed that this, in turn, decreases teacher autonomy. The teachers in this study described experiences that are contrary to this claim. They each explained that they do work together to develop a shared vision and approach to supporting their students, but each emphasized that it is necessary to trust their partner teacher and respect their complete autonomy. They also talked about how the departmental structure provides them with the opportunity to focus on fewer subjects and therefore take more risks, increase instructional innovation, and use reflection to modify their instruction within each school day. At no point during the study did any of the participants speak about pressure to assimilate. Instead, they each

talked about the expanded professional freedom that they have experienced since their decision to departmentalize.

The research also talked about the potential negative impact of departmentalization on relationships between teachers and students at the elementary level. Hood (2010) claimed that the single classroom model provides a structure that allows for deep and more impactful relationships with students. Lui (2011) added that switching teachers and classes would increase student stress and have a negative impact on their experience at school. The results of this study do not align with the predictions of these authors. Instead, the teachers in this study spoke about the benefits of seeing multiple students in a single day. They explained that relationship fatigue and frustration is reduced in the departmental structure. The participants expressed that they are able to build relationships of equal strength, but with more students. In addition, they are able to invest more energy into each student because they only need to sustain that energy for a concentrated time. Each teacher in this study made it clear that they believe that they have stronger and more impactful relationships with students now that they work in a departmental structure. In addition, each values the opportunity to interact with approximately 60 kids each day instead of only 30.

Contributions to the Body of Research

In this study I asked the following question: how does a departmental structure influence the experiences, perceptions, and self-efficacy of elementary teachers as each relates to mathematics instruction? There is existing research about efficacious instructional practices in mathematics, the factors that impact teacher self-efficacy and job satisfaction, and there is even literature that predicts potential benefits and detriments associated with the implementation of a departmental structure in elementary schools. I identified that there was a gap in the current

literature that my study would address. There was no research that explored the lived experiences of elementary teachers who currently teach in a school implementing a departmental structure in order to understand the impact of this structure on teacher math self-efficacy.

There is a significant amount of research showing that expertise and confidence in mathematics is important for instructional efficacy and teacher self-efficacy. This study explored departmentalization as a structure that provides the opportunity for teachers that are most confident in mathematics to teach that subject. Each of the participants in this study expressed that although they were not mathematicians, they all felt very comfortable with the subject matter. They also each talked about experiences at previous schools where colleagues had high levels of math anxiety that impacted their instructional focus and practice in a negative manner. The teachers in this study explained that the negative comments and feelings about elementary math that permeated their previous school sites did not exist at Isaac Newton Elementary. They attributed this to the fact that teachers were able to choose the subjects that they taught and were not forced to teach those that they are not as comfortable with.

There is also a significant body of research that identifies factors that impact teacher self-efficacy and job satisfaction. In addition to expertise and self-confidence, other contributing factors identified were meaningful professional learning and collaborative opportunities, autonomy and empowerment, and a manageable workload and level of professional stress. This study explored the impact of departmentalization on these key factors at an existing elementary school currently implementing a departmental structure. The data gathered in this study presented a clear picture. Each teacher in this study expressed that they are much stronger teachers of mathematics when they do so in the departmental structure. Although they did explain that subject and grade specific professional learning and collaborative opportunities were

limited, they did not hesitate to say that they prefer teaching at a school with departmentalization. They feel very confident in their instructional practice and value the opportunity to learn, reflect, and improve upon their practice each day. They explained that they are able to focus their attention on only two subjects and are therefore able to better plan, be creative, and take risks. They also each spoke to the manageable workload and reduction of job related stress. They no longer need to study, plan, set up, and teach lessons for four different subjects each day. The participants said that they enjoy their practice and feel far more confident in the departmental structure.

One additional element that developed during this study was the importance of administrative trust in empowering and increasing the self-efficacy of teachers. Each of the teachers talked about the willingness of the school principal to trust them as content and instructional experts. They explained that they are not micromanaged and are instead supported and empowered in the departmental structure. Mr. Brann was especially appreciative of the trust and support that he receives from administration. He explained that the principal holds teachers to high expectations, but provides the opportunity for teachers to be flexible and take risks in order to meet the needs of all students. He stated “I can’t emphasize enough how important administrative support is and how strong our current administrator’s leadership has been in encouraging teachers to seek best practices, take risks and maintain a growth mindset.” It became clear in this study that school leadership and teacher autonomy are key elements which contribute to teacher self-efficacy.

Recommendations for the Implementation of a Departmental Structure

As I referenced in the second chapter, Chan and Jarman (2004) identify three recommendations for the implementation of departmentalization at the elementary school level:

piloting the structure at the higher grade levels first, utilizing flexible student grouping, and gathering data on student achievement and teacher satisfaction to be used to inform future decisions and adjustments. The implementation process at Isaac Newton Elementary School aligned well with the first of these recommendations and that has proven to be beneficial. It was especially helpful to allow the fifth grade teachers to pilot the structure. All three of the teachers in this study talked about how they learned from the experiences of those first movers. They saw that departmentalization was beneficial for the professional practice of their fifth grade colleagues and that student learning was impacted in a positive way. As a result, the teachers in this study were willing to experiment with the departmental structure as well. This trend of expanding departmentalization at the school has continued to spread as this year, even the first grade teachers have decided to implement a departmental structure. I recommend that teachers interested in departmentalization identify and connect with colleagues at their school site or at a nearby school that are already engaged in this structure. They should look for opportunities to observe classroom dynamics and have honest conversations in which they ask the questions that are important to them. Administrators that are interested in implementing departmentalization should help to build these relationships and provide opportunities for observation, conversations, and collaboration.

In addition to validating the first recommendation of Chan and Jarman (2004), this study has provided further insight about how to best implement departmentalization. First, this study reveals that it is critical that teachers in a school are given the autonomy to choose to implement the departmental structure only if they decided to do so. This process should not be mandated by administration. Mrs. Bradley explained that initially, she had no interest in implementing departmentalization. She thought it was a lazy approach to teaching that would only benefit the

teacher. If she had been forced to implement a departmental structure, she would have resisted, and the experience would have been negative. It was only because she had the opportunity to observe from afar that she ultimately recognized the benefits of this structure and decided to implement it herself. Mrs. Miller explained that “the implementation of departmentalization cannot be forced. It must be initiated and implemented by teachers that are on board because they see the benefits of departmentalization and want to try it.” Mr. Brann emphasized how important it was to him that the administrator at Isaac Newton provided support and guidance, but has never forced departmentalization or micromanaged in any way. This autonomy communicates trust. Because he knows he is trusted, Mr. Brann is willing to take risks and try new things to improve his practice and grow continuously. Current administrators should look for opportunities to expose teachers to the possible benefits of departmentalization, but should avoid putting too much pressure on teachers to implement the structure. Administrators must respect teacher autonomy and make it clear that they will provide all necessary support for teachers interested in exploring departmentalization in their own practice.

As mentioned above, trust and choice are critical in both empowering and motivating teachers to embrace innovation. This is why diffusion serves a practical and useful framework for the mass implementation of departmentalization within a school and even an entire district. The key is to find initial innovators that have self-efficacy, are open to innovation, and recognize the need or value of change. Although there are often pressures and positive intentions behind immediate and widespread change in schools and districts, the process of innovation should not be rushed or forced if it is to be well-received and sustainable. It should not be the role of the school or district administration to force departmentalization on an entire school system unilaterally. Instead, it should be the role of the school or district leadership to identify potential

initial innovators with strong social capital and encourage them to explore departmentalization as a potential positive change in their own practice. Leadership should provide the support for these initial movers and then shine a spotlight on the work that they are doing. This honors trust and choice and ultimately increases the likelihood of the systematic diffusion of this innovative practice.

It is equally critical that the teachers in a departmental structure have the opportunity to choose and work with a partner that is compatible. Mr. Brann talked about how much he respects his teaching partner and the ease of their partnership. He explained that collaboration and planning happens very naturally and that he expects that their collaboration will increase in the future. Mrs. Bradley and Mrs. Miller were much more adamant about the importance of having a strong teaching partner. They each described the relationship as “spouse-like” and have experienced situations where a negative teaching partnership can be frustrating, draining, and can have a drastic impact on job satisfaction. They explained how difficult it can be to work with a teacher that they aren’t able to fully trust. They contrasted that with their current situation. They are now teaching partners with each other and are very much enjoying their professional day to day experiences as a result. They explained that when the teaching partnership is strong, and there is a shared trust and vision, each teacher grows professionally, teacher self-efficacy is increased, stress is reduced, and the impact on the students is positive.

Recommendations for Further Research

Although this case study provides valuable insight on the impact of departmentalization on teacher self-efficacy, there is still much opportunity for further research that would provide extended learning and understanding about departmentalization in elementary schools. This was a small case study of three teachers in one school in Northern California. It would be valuable to

replicate this type of research on an expanded scale. This could include many similar studies done in different schools throughout the United States. Researchers interested in conducting a similar case study should begin by identifying a single elementary school or multiple elementary schools in an area that are currently implementing or beginning to implement a departmental structure. The researcher should then contact the site administration and have them identify teachers that are willing to participate in the study. It is critical that the researcher earn the trust of all participants in the study in order to optimize transparency and learning during the interview and data collection portion of the study. Interviews should be conversational and a low pressure opportunity for participants to share their career narrative and professional insight. The researcher should be prepared with potential follow up questions in the interview and should also establish a structure for follow up after initial data analysis. Data should be analyzed in hopes of identifying common themes that can then be compared to the current body of research including what was learned in this study.

In addition to replication based studies, it would also be valuable to have a wide reaching study that surveys a large number of teachers at elementary schools with and without departmentalization. This type of survey could gather data on teacher self-efficacy, job satisfaction, teacher perceptions, teacher experiences, and much more. Data from a study like this could ultimately be much more generalizable. Researchers interested in this type of study should begin by identifying, modifying, or developing a reliable and appropriate survey tool that will gather the desired information about teacher math self-efficacy in elementary schools with and without departmentalization. Because I do not know of any way to easily identify a large number of elementary schools currently using departmentalization, I recommend doing a comparative study in which the survey is administered to a large number of elementary teachers

regardless of school structure. In the survey, participants should select the type of school structure they are in and this will help the researcher to organize the data for comparison. I strongly recommend that descriptions of each type of school structure are included in the survey as the language used to describe a school structure may vary from site to site. Once a survey tool is developed, the researcher should identify multiple school districts that are interested in participating in the study. The researcher will need to work with the research department in each school district to gain approval, disseminate the surveys, and gather the data. All data gathered can then be quantitatively analyzed and compared to the current body of research.

A third area for potential future research should focus on quantifying the impact of departmentalization at the elementary level on student achievement. One of the primary reasons to study unique structures in education is to build an understanding of the impact on student learning. There is much research presented in chapter two that shows a correlation between high teacher math self-efficacy and greater student learning. That being said, it would still be valuable to have research that quantifies that impact of elementary school departmentalization on student learning and achievement. This type of study could take on many forms, but the purpose of the study would be to compare the mathematical achievement of elementary students in schools with departmental structures with that of students in the traditional single classroom structure. It would be challenging, yet critical that the researcher considers and controls for the wide array of variables that exist in elementary education.

Conclusion

In this study, I conducted individual interviews to examine the lived experiences of three elementary school teachers that have taught or are currently teaching math in a departmental structure. The purpose of this study was to build an understanding of the impact of this structure

on teacher math self-efficacy because there is evidence of a correlation between teacher math self-efficacy and student achievement in mathematics. The results of this study were clear. The teachers involved unanimously agreed that they felt that they were more prepared, competent, and confident to deliver affective and impactful math instruction in the departmental structure than they did in the traditional single classroom structure. The teachers attributed the increased math self-efficacy to the opportunity to focus on professional learning and instructional planning for mathematics and only one other subject rather than the four subjects in the traditional model. The teachers enjoy the opportunity to learn from teaching a lesson multiple times and each explained that they improve from day to day and from year to year. They feel confident in their personal mathematical expertise and credit this confidence with their ability to help students make conceptual connections and embrace mistakes as opportunities for learning.

Although these teachers have embraced departmentalization and view it as a beneficial structure, they emphasize that this structure is not for everyone and should not be forced. They explained that teacher buy-in is critical and this only develops when teachers view the structure as beneficial. The teachers in the study recommended that a change to departmentalization should be facilitated by administration, but initiated, driven, and designed by teachers. They also explained that teacher pairing in this structure directly impacts job satisfaction and stress level. When administration is willing to allow the teaching staff to drive decision making, the teachers perceive that they are respected as professionals and instructional experts. When teachers are fully on board, and wise structural decisions are made, departmentalization can have a significantly positive impact on teacher math self-efficacy and as a result, a positive impact on student achievement in mathematics as well.

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APPENDIX A: SNAPSHOT OF THE LITERATURE REVIEW

As part of my dissertation, I did an extensive literature review. The following list gives an overview of factors and practices that impact mathematics instruction:

- Teachers that are willing to take instructional risks and make conceptual connections are able to facilitate learning that goes beyond procedures and computation.
- Teachers' self-perceptions about their ability to teach a subject well impacts job satisfaction and instructional performance.
- The majority of elementary teachers in America have a preference for language arts and social science. Over half of teachers report feeling inadequate to teach mathematics and experience math anxiety that impacts instruction and learning.
- Professional development and collaboration have significant impacts on classroom instruction. These are especially effective when they are focused, consistent, and relevant to what is happening in the actual classroom environment.
- Effective formative assessment has been shown to be one of the most significant practices in impact student learning and achievement.
- High-stakes testing impacts teacher self-perception and can drive instructional practice. The changes associate with the Common Core State Standards for Mathematics has increased anxiety for many teachers.

APPENDIX B: INTERVIEW GUIDE

1. Please tell me about your journey to becoming an educator. Tell me about your background and what motivated you to choose this career.

2. Now tell me about your life as an educator up to this point.

Be sure to follow up if necessary to gather the following pertinent information: Number of years teaching, what subjects and grades have been taught, successes and frustrations experienced, perceived strengths and weaknesses, current perception of school environment, and what aspects of education are most valued.

3. Describe for me your previous experience with mathematics, both personally and as an educator.

Be sure to get an understanding to the teacher's disposition towards math. Is there any math anxiety or are they pretty confident in their math ability? Also try to get a feel for how they anticipate teaching math. Is there more of a stand and deliver old school style or will instruction be more student centered and common core aligned?

4. Describe to me your thoughts on thoughts on Departmentalization. What are the primary benefits? What are the primary challenges that you've experienced?

APPENDIX C: EMAIL SCRIPT FOR PRINCIPAL

Dear Principal,

My name is Rich Haley and I am in the process of completing my dissertation as I seek a Doctoral Degree in Educational Leadership from the University of the Pacific. I will be doing a case study on a group of teachers in an elementary school that is implementing departmentalization. The study will focus on teacher self-efficacy as it relates to math instruction. I understand that Isaac Newton Elementary has been utilizing a departmental model for a number of years and I am asking permission to reach out to some of you teachers in order to ask them to participate in my study. I believe that there is a lot to be learned from the work that is happening at your school site. What is learned can inform other schools that are interested in or already implementing departmentalization. In addition, because the research will be participatory and reflective, there is the potential benefit of teacher growth on your own campus. If you are willing to let me contact teachers, I would ask that you please provide me with a list of teachers that are currently teaching mathematics in a departmental structure on your campus. This would include any teacher teaching only math, or teaching math and one other subject.

Thank you,

Rich Haley

APPENDIX D: EMAIL SCRIPT FOR POTENTIAL PARTICIPANTS

Dear (teacher's name),

My name is Rich Haley and I am in the process of completing my dissertation as I seek a Doctoral Degree in Educational Leadership from the University of the Pacific. I am interested in studying your experiences and the experiences of your colleagues as you engage in teaching elementary mathematics in a departmental model. This is a unique model and there is a lot to be learned from the work that is being done at your school. What is learned will inform other schools and teachers that are interested in or are currently implementing a departmental structure.

In this study, you would be asked to participate in a semi-formal interview that will last for approximately 30-45 minutes. I will then transcribe and summarize the interview before sending it to you for review and further input. You will receive a twenty dollar gift card for your willingness to participate and volunteer your time.

I would appreciate the opportunity to meet with you in person to talk through the details of this study. If you are willing to meet, please let me know a time and location that would be most convenient for you.

Thank you and I look forward to speaking with you further,

Rich Haley